

ECONOMIC GEOGRAPHY *of* INDIA & PAKISTAN

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PREFACE TO THE FIFTH EDITION

The object of writing this book is to provide our students of Commerce and Geography with a reasoned account of the resources and industries of India and Pakistan on the basis of geographical forces. In other words, the geographical basis for our production of raw materials and geo-economic facts of our trade, transport and industries have been explained. The book places the student in possession of information that will enable him to assess the resources and to indicate the present and the future trends of their exploitation.

The book has been thoroughly revised and enlarged by considerable additions at every stage. Up-to-date charts, tables and maps have been given. Dr. R. K. Bhan, M.A., Ph.D. (Lond.), Ministry of Education, Dr. V. Nath, M.A., Ph.D. (Wisconsin) of Planning Commission helped me with their valuable suggestions for which I am grateful. My best thanks are also due to Prof. D. R. Mitra, M.A. (Edin.), Bar-at-Law of Calcutta University, Prof. S. N. Banerjee, M.A., C.A. of City College, Prof. L. C. Chakravarty, M.A. of David Hare Training College, Calcutta, and Dr. A. N. Kapur, M.A., D.Phil. of Delhi Polytechnic. Sri Binoy Chakravarty of the Statistics and Intelligence Branch, Ministry of Finance, prepared maps, charts and diagrams.

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CONTENTS

CHAPTER	PAGE
Introduction: Object of Studying Economic Geography of Indian Union	1
I. Influence of Physical Environment: area, size, location, climate and rainfall, soils	3
II. Distribution of population—races and languages ..	24
III. Agricultural Production: Present condition, types of farming, causes of low productivity, food supply position in India ; <u>rice</u> , wheat, millets, barley, maize, pulses, <u>tea</u> , coffee, tobacco, <u>sugar cane</u> , <u>jute</u> , hemp, <u>cotton</u> , <u>oilseeds</u> , rubber ..	35
IV. Irrigation works and Multi-purpose projects: Types of irrigation works in India: wells, tanks, canals, canal irrigation in East Punjab and U.P. Progress of irrigation. Objects of multi-purpose projects— <u>Damodar Valley project</u> , <u>Hirakud Dam project</u> — <u>Kosi project</u> — <u>Tungabhadra project</u> , <u>Bhakra and Nangal project</u> — <u>Rihand Valley project</u>	93
V. Forests and their products: Important forest areas —types of forests—uses of forest products—common commercial timbers	109
VI. Livestock and their products: Number of livestock —sheep and wool, cattle and dairy products ; leather and hides. Poultry	117
VII. The <u>Fisheries</u> : Sea fisheries, deltaic fisheries and river fisheries ; fish products	122
VIII. Mineral resources: Iron, <u>manganese</u> , copper, gold, <u>mica</u> , salt, saltpetre etc. ; power supply in India ; coal, <u>petroleum</u> ; hydro-electricity	130

CHAPTER	PAGE
IX. Manufacturing industries ; cotton textile, jute mill industry ; sugar, tea plantations, silk, rayon, woollen industry, <u>iron and steel</u> , <u>paper-making</u> , chemical industry, <u>glass industry</u> , aluminium industry, leather industry, ship-building, aircraft manufacture, automobile industry, lac industry, <u>cement industry</u> , match industry ..	168
X. Facilities of Transportation: Railways ; Road transport ; Waterways ; Sea routes ; Airways ..	220
XI. Foreign Trade: Characteristics of India's foreign trade ; Effect of partition, present position ; chief exports and imports ; trade relation with United Kingdom, Pakistan, Iraq, Burma, Ceylon, Japan, Germany, U.S.A. ; Land Frontier trade	243
XII. Ports and Trade Centres: Principal ports of east and west coast ; trade centres ; Indian States ..	258
XIII. Dominion of Pakistan: area and size ; population ; natural regions ; irrigation, agriculture—rice, wheat and other grains, gram, sugarcane, tobacco, tea, cotton, jute, oil-seeds ; forests ; mineral products ; hydroelectric power ; fruit production ; livestock population ; fisheries ; manufactures—cotton mills, sugar industry, woollen industry and others ; communications—railways, frontier roads, waterways, aviation, ports and trade centres ; foreign trade ..	276
XIV. Burma	332
XV. Ceylon	341
APPENDIX	345
BIBLIOGRAPHY	350

MAPS AND DIAGRAMS

FIG No.	PAGE
1. India and Surrounding Countries	5
2. Political divisions of India	6
3. Indian Union—Mean Annual temperature	11
4 Indian Union—Mean Annual Rainfall	12
5. Mean Rainfall during the Season of General Rains	13
6. Mean Rainfall of the Cold Weather Seasons	14
7. Mean Rainfall during the Season of the Retreating Monsoon	16
8. Mean Rainfall of the Hot Weather Season	17
9 Soils in Indian Union	18
10. Graph showing Population in the Provinces	26
11. Density of Population	28
12. Indian Emigration	30
13. Land and Its Utilisation	35
14. Agricultural Types of India	36
15. Acreage under Crops	39
16. Acreage and Production of Principal Food Crops	41
17. Area and Yield of Rice	45
18. Rice Cultivation in India	46
19 Rice Production in Indian Union	49
20 Area and Production of Wheat	51
21. Wheat Production in Indian Union	54
22. Wheat Cultivation in India	55
23. Jowar Cultivation in India	57
24. Tea Production	63
25. Tea and Coffee Cultivation	65
26. Area and Production of Raw Sugar	72
27. Sugarcane Cultivation	73
28. Acreage and Production of Jute	76
29. Area and Production of Cotton (Ginned)	79
30. Acreage and Production of Cotton	80
31. Cotton Cultivation	81
32. Oil Seed Cultivation	84
33. Area and Production of Linseed	85
34. Area and Production of Groundnuts	86
35. Area and Production of Sesamum in Indian Union	87
36. Area and Production of Castor seed in Indian Union	88
37. Canal Irrigation in the U. P.	96
38. Area sown and irrigated in Indian Union	97
39. Damodar Valley Project	101
40. Hirakud Project	103
41. Kosi Project	104

Fig. No.	PAGE
42. Nangal Bhakra Projects	106
43. Forest—Areas under Regular Management	110
44. Distribution of Forest	111
45. Fisheries	125
46. Iron	135
47. Iron Ore Production in India	136
48. The Iron-ore fields of Orissa	137
49. Manganese Ore Production in India	139
50. Gold	142
51. Gold Production in India	143
52. Mica Production in India	145
53. Salt-sources and their Relative Importance	147
54. Coalfields of Bengal, Bihar and M.P. (in parts)	156
55. Hydro-Electric Power and Petroleum Centres	163
56. Jute Mill centres in the Hooghly Basin	178
57. Situation of Jamshedpur	194
58. Iron and Steel Production	196
59. Total Railway Mileage	221
60. Assam Linked with West Bengal	223
61. The Map showing Railway Lines	227
62. Road Mileage	228
63. Main Roads in India	230
64. The map showing Airways of Indian Union	239
65. Direction of India's Foreign trade by Sea	246
66. Composition of India's Foreign Trade, 1951-52	250
67. India-United Kingdom Trade, 1951 and 1952	252
68. Proposed Hinterland of Kandla	262
69. Bombay	263
70. Madras Harbour	265
71. Vizagapatam	266
72. Calcutta and Its Suburbs	267
73. Delhi	272
74. East and West Bengal	276
75. East and West Punjab	277
76. Population of Pakistan	279
77. The North West Frontier Mountains from the Sea to the Pamirs	280
78. Lahore	281
79. Rainfall map of Pakistan	282
80. Irrigated and sown area in Pakistan	284
81. Canal Colonies of West Punjab	285
82. Rice Cultivation in Eastern and Western Pakistan	289
83. Wheat Cultivation in Eastern and Western Pakistan	291
84. Maize in Pakistan	292
85. Gram producing areas in Pakistan	293
86. Sugarcane in Pakistan	294
87. Tobacco in Pakistan	295
88. Cotton in Pakistan	297

FIG. No	PAGE
89. Jute in Pakistan	300
90. Distribution of Minerals in Pakistan	303
91. Water power projects in Western Pakistan	307
92. Distribution of Industries in Pakistan	314
93. Railways in Pakistan	317
94. The Khaibar Road	319
95. Karachi Harbour	323
96. Karachi	324
97. Chittagong	325
98. Comilla and Noakhali	328
99. Burma	333
100. Akyab and Its hinterland	338
101. Ceylon	342

INTRODUCTION

Economic geography of the Indian Union is a study of economic resources and industries in relation to physical environment. The major industrial and commercial activities of the country to-day are agriculture, forestry, manufacturing, transportation and trade. The minor industries are fishing and stock-raising. Bihar is noted for mining, Bombay and the Hooghly basin for manufactures, coastal regions of Bombay, Madras, Orissa and West Bengal for fishing, and the Indo-Gangetic plain for agriculture. The subject explains how the mode of life of people in different areas of the country is influenced by environmental factors, bodies of water and natural resources. It also shows how far we can utilise the opportunities which the physical environment of the country offers for our material benefit. Our ability to utilise the elements of environment always depends on our knowledge and intelligence. As we advance in knowledge our ability and skill increase and we make the environment more useful for our requirements. The dense forest region of the Sundarbans in the southern fringe of West Bengal is being cleared for farming ; uncultivated and barren parts in Uttar Pradesh, Madhya Pradesh and East Punjab are being colonised with the development of irrigation projects.

Thus, if the subject is properly understood, and appreciated, many of our problems connected with food, industry, transportation, population and trade can be solved.

It is necessary to bear in mind that physical environment does not always remain unchanged. Rivers may change their courses or die slowly. The rivers may deposit silts at their mouths to form deltas as in West Bengal where we find coast-lines emerging as a result of formation of deltas. In like manner, changes take place by the erosion of mountains and hills and the work of volcanoes and earthquakes.

It is also necessary to emphasise that our advance in knowledge for the utilisation of natural resources depends on human factors like Government, religion, and social institutions, functioning properly in our service.

CHAPTER I

PSYICAL ENVIRONMENT*

Area : Location : Coast

The Republic of India measures about 2,500 miles from north to south and 1,000 miles from east to west and presents the form of a somewhat irregular equilateral triangle. The Indian Republic has 11,38,814 square miles of area with 357 million population including Kashmir. Administratively, the Republic consists of 28 States which are Assam, Bihar, Bombay, Madhya Pradesh, Madras, Orissa, Punjab (I), Uttar Pradesh, West Bengal, Hyderabad, Jammu and Kashmir, Madhya Bharat, Mysore, Patiala and East Punjab States Union, Rajasthan, Saurashtra, Travancore and Cochin, Ajmere, Bhopal, Bilaspur, Coorg, Delhi, Himachal Pradesh, Cutch, Manipur, Tripura, Vindhya Pradesh, the Andamans and the Andhra Pradesh.

The geographical location of the Indian Republic is a factor of great importance affecting her commerce, defence and climate. Her location between the densely populated areas of Burma, Malaya, Indonesia and Siam on the east and the industrially backward Middle East can make her one of the greatest commercial nations of the future. She stands almost at the centre of the Eastern Hemisphere and at the head of the Indian Ocean

* Before the partition in August, 1947, India comprised an area of 15,75,107 square miles, of which 10,84,774 square miles, or 60 per cent. were under the British. The remainder consisted of Indian States and foreign possessions divided between France and Portugal. The population of the Indian Empire (British India and Indian States) was nearly 390 million. The foreign possessions had a total population of 8,70,000 people in an area of 1,274 square miles. By the division of India, three-fourths of the entire population of the country as well as two-thirds of the entire area have come under the Indian Union. The partition of India has brought in its wake serious consequences for the economic development of the Indian Republic. It means, in the first place, the diminution of population by 70 million (although soon after partition, about 6 million people were forced to leave their homes in Pakistan and migrate to India); and, in the second place, Indian Republic lost with these territories (now constituting Pakistan) rich economic resources in jute, cotton, hides and skin, petroleum, rock salt, chromite etc. Thirdly, the textile industry is facing the critical problem of raw materials. Calcutta's jute mills are much dependent on Eastern Pakistan for supplies of raw jute; the cotton industry, too, has to depend to a certain extent on Pakistan raw cotton.

She commands all the sea routes for trade between the old and the new worlds—towards Africa and Europe in the west, Australia in the south—Siam, China, Japan and America in the east. India, therefore, has a highly favourable situation for the purpose of international commerce.

India has both natural and artificial boundaries. The natural frontier consists of the Himalayas on the north, the Arabian sea on the south-west and the Indian ocean on the south. In the west, the Indo-Pakistan border is open and follows the upper course of the Rabi in Amritsar district and then turning southward the boundary follows the Sutlej in Ferozepur district. From Ferozepur we find that the boundary of the Republic coincides with the western limits of Rajasthan. Assam forms the eastern-most boundary of India. It touches Tibet in the north, East Pakistan in the south-west, China in the north-east and Burma in the east. About three-fourths of India's boundaries are mountains and seas and are, therefore, well-suited to defence. From the politico-geographical viewpoint, the weakest part of the Indian boundary is that of East Punjab.

India has a coast-line of 3,500 miles, which gives one mile of coast to every 400 square miles of area. The coast-line of India, in spite of its great length, is broken by only a small number of inlets and possesses a few islands round it. The continental shelf of the country is shallow and the shores are usually flat and sandy. Even the estuaries like those of the Mahanadi, Godavari, Krishna, Cauvery, Narmada and Tapti do not permit passage by sea-going vessels. The Ganges estuary is an exception, but here too dredging operations are essential. Because of these physical characteristics India possesses few ports and harbours in proportion to her coast-line. The Gulf of Cutch, the Gulf of Cambay, the back-waters of Cochin and Malabar, the Palk Strait and the Gulf of Mannar, and the indentations at the mouths of the Ganges are the inlets and straits of India. These are all shallow with the exception of the *backwaters* of Cochin and Malabar and permit navigation when they are made deep by dredging operations.

The east coast of India runs from the mouth of Kalindi in Khulna, on the border of Eastern Pakistan along the Sundarbans in a westerly direction, to the Hugli river. From the Hugli, the coast proceeds south-west to the Kistna Delta, from where it

continues south to Cape Comorin which is the southernmost point of India. The eastern coast is practically unbroken except at the deltas of the river mouths. *The west coast runs from*

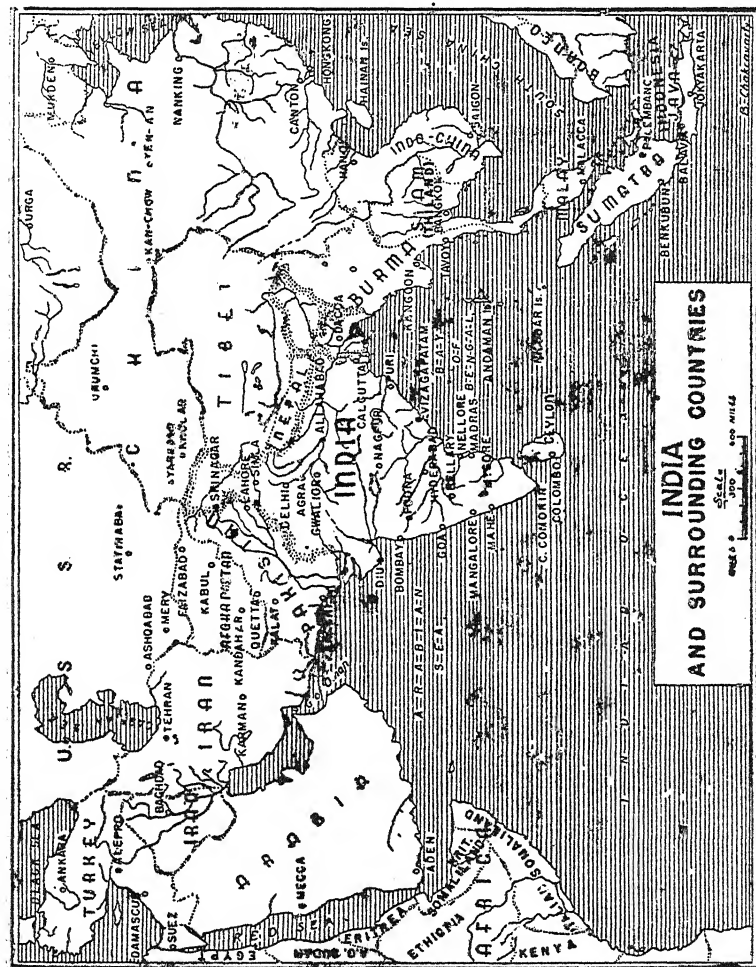


FIG. 1. The geographical location of India in the centre of Asia's three great Southern Peninsulas is of great significance in the political and economic spheres.

Cape Comorin. The coast runs north to the Gulf of Cambay, where the Kathiawar Peninsula juts out west from the mainland. The coast continues north-west from Kathiawar. The opening (*i.e.*, the gulf) between the north-west coast and the peninsula is

known as the Gulf of Cutch. The west coast is backed by the edge of the Deccan Tableland and has got a narrow plain between the Western Ghats and the Arabian Sea. The coast is surf-beaten and from May to October gales are common. There are no indentations except the Gulf of Cambay and the Gulf of Cutch.

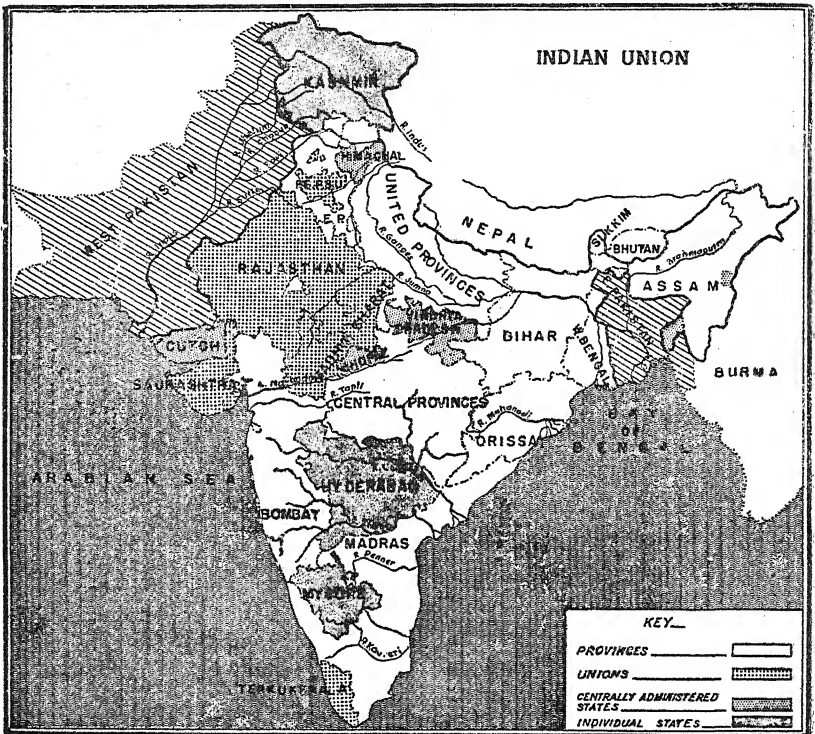


FIG. 2. Political divisions of India.

The Natural Regions

A region of such a vast extent is naturally of diversified configuration—plains, plateaux and mountains. Geographically India presents three natural divisions, each of which is quite unlike the other. These divisions are based on physical conditions.

- I. The Mountainous regions of the North.
- II. The Indo-Gangetic plain.
- III. Peninsular India.

I. *The mountainous regions of the north.* The Himalayas run for 2,000 miles from the eastern extremity of Assam to the western limits of Kashmir with a breadth varying from 180 to 220 miles and contain some of the highest peaks in the world. The Himalayas, a series of parallel ranges intersected by valleys and extensive plateaux, rise abruptly from the plains in the east and gradually in the west. The average height of the Himalayas is over 17,000 ft., and about forty peaks are known to exceed 24,000 ft. The best known of these peaks include Nanga Parbat (26,630 ft.), Nanda Devi (25,660 ft.), Dhavalgiri (26,820 ft.), Mount Everest (29,002 ft.), and Kanchinjunga (28,150 ft.). *The snow-line* is at a height of about 16,000 feet on the southern slopes of the Himalayas and higher on the northern. These highlands are almost entirely part of the *newfold mountains* of Asia, and consists of long lines of folded ranges of comparatively recent formation "They form great arcs, curved convexly towards the south or as in the north-east, diverging ridges radiating from a northern mountain complex."

Three distinct parallel ranges are noticeable in the Himalayas: (a) *The Great Himalayas** comprising the highest portion with an average height of 20,000 feet, (b) the *Lesser Himalayas* comprising the ranges with an elevation of less than 15,000 feet, and (c) the *Outer Himalayas* comprising the hills lying between the Lesser Himalayas and the plains. In front of the Outer Himalayas, lies the Terai jungle—the abode of many wild beasts.

The Himalayan chain acts as a natural protective wall for India and provides rain-water for the plains by arresting the moisture-bearing clouds of the south-west monsoon. And in winter it prevents the piercing cold winds of Central Asia from coming into India. It gives birth to mighty rivers like the Indus, the Ganges and the Brahmaputra. The Lesser and Outer Himalayas are very rich in animal and forest resources. In the Himalayan region, 15·3 million acres of land are under forests. There are extensive tea-plantations in the Outer Himalayas from Assam to the East Punjab. Physical difficulties do not permit

* The Great Himalayas, again, contain four sections: (a) The Kashmir Himalayas, (b) the Kumaun Himalayas extending from the Sutlej to the Kali, (c) the Nepal Himalayas extending from the Kali to the Teesta rivers, (d) The Assam Himalayas extending from the Teesta to the eastern-most frontier of India.

cultivation except in the Lesser Himalayas where rice, chillies, ginger, tea, wheat and fruits are raised.

The scenery and the mighty peaks of the Great Himalayas attract tourists and climbers from different parts of the world and thus provide a source of income to many hill stations. Because of such influx of people, many hill stations have developed hotel industry in India, although it is not comparable to what exists in such countries as Switzerland and Italy.

The foothill regions of the Himalayas are without exception intensely malarious. The areas situated at a height exceeding 5,000 feet above sea level are, however, free from malaria. Usually there are two periods of malaria incidence—one just before the outbreak of the monsoon and the other when the monsoon is over. During the rains most of the breeding places are washed out and when the monsoon is heavy, there may be a complete cessation of transmission for several weeks. Thus there is a very short malaria-free season along the foothills of the Himalayas. The reason is that the *vector mosquitos* are stream-breeders and therefore during the monsoon when the streams are torrential, breeding facilities are eliminated.

II. *The Indo-Gangetic plain.* This northern plain, situated towards the south of the newfold-mountain belt, is part of a great depression which is traceable across northern Africa, southern Europe and southern Asia. The plain of Hindusthan occupies the greater part of northern India and covers more than 1,500 miles from east to west with a width of 200 miles. This plain is formed by the basins of the Ganges, the Indus and the Brahmaputra with their tributaries and has been the cradle of Indo-Aryan civilisation from the earliest times. The geographical advantages are (a) fertile soil, (b) favourable climate, (c) flat surface rendering possible the construction of roads and railways, (d) rivers and (e) mineral products etc. In the *Gangetic plain*, rainfall is heavy and agriculture is the chief occupation of the people. It contains more than 40 per cent. of the total population of India. *The Western plain* beyond the Ganges is more or less dry. Agriculture is practised with the help of irrigation. Although the region contains only 10 per cent. of India's population, it has an extensive and well-developed system of irrigation. In the entire Indo-Gangetic plain forests cover only 4·8 million acres of land.

III. *Peninsular India* is a tableland and lies within the tropics. This tableland is part of an ancient plateau land of unfolded rock of primary origin largely crystalline in character. Similar plateaux compose parts of Africa, Arabia, South America and Australia and it is reasonable to suppose that all these areas were once continuous. Similar features of relief are found in all, such as flat-topped highlands, almost vertical valley sides, terrace-like differences in elevation and lava outpourings along fault lines.

The Peninsular India is bounded on three sides by mountains—on the north by the Vindhya and the Satpura ranges including the Malwa and the Aravalli plateaux, on the west by the Western Ghats and on the east by the Eastern Ghats. Two coastal strips of flat land exist on the outer side of both the Western and Eastern Ghats—the western coastal strip is known as the Konkan in the north and Malabar in the south; the Eastern coastal strip is known as the Coromondal Coast.

The Western Ghats run along the Malabar coast of India continuously for a distance of about 1,000 miles down to Cape Comorin. The plain between the Ghats and the sea is 30 to 40 miles wide. The Ghats look like an immense wall facing the ocean. The mean height is about 3,500 feet, the highest point being 8,700 feet (Dodabetta). The important passes connecting the Central tableland with the west include the Palghat, the Thal, Bhorghat and Nama. The Nilgiris form the converging point of the Western and Eastern Ghats by which the Deccan is enclosed. In the Western Ghats, the forests occupy about 8 million acres of land.

The Eastern Ghats stretch from the Mahanadi river valley for about 500 miles south-eastwards to the nucleus of the Nilgiris. The mean height of the Eastern Ghats is scarcely more than 1,500 feet. The Eastern Ghats are much less elevated and do not form a continuous chain like the Western Ghats. The Eastern Ghats are at a much greater distance from the coast, the intervening lowlands averaging from 50 to 80 miles. About 10 million acres are covered by forests.

The west coast region receives an annual precipitation of about 100 inches, while on the east the rainfall is between 20 and 50 inches. Temperature is high throughout the year in Peninsular India, mean temperature being about 75°F.

As the general slope of the tableland is from west to east, most of the rivers flow into the Bay of Bengal. The Mahanadi, Kistna, Pennar, Cauvery and Vaigi flow into the Bay of Bengal; the Tapti and Narmada flow into the Arabian Sea. The Peninsular rivers are all rain-fed and they turn into mere puddles during the dry season. The principal agricultural crops are cotton, tea, coffee, and spices. Cinchona, cocoanut and forest products are also available.

In the Deccan, there are five natural divisions: (i) The narrow west-coast region from Tapti to Cape Comorin receives the full force of the current of the monsoon from the Arabian Sea and therefore rainfall is over 100". The soil is very fertile and the crops are rice, spices and fruits. The density of population is near about 400 per sq. mile. (ii) The Black Soil region consists of deep basaltic soil, which is highly retentive of moisture and therefore does not stand in need of irrigation. It is extremely fertile and owing to the lime it contains, the region is suitable for cotton growing. Millets, oilseeds and wheat are also cultivated. (iii) North-eastern Deccan has poor soil, but the rainfall is over 50". Tank irrigation has much developed. Rice is the principal crop. (iv) Southern Deccan is a *rain-shadow area*, and is frequently visited by famine. The soil is very poor and cultivation is possible only by means of irrigation. Population is scanty. (v) The Eastern coastal plain is a low, alluvial land. The northern portion has summer rain and the southern region has winter rain. The coast-line is broken by the deltas of the rivers and many lagoons. The average rain-fall is between 40" to 50". Rice is the principal crop. Millets and indigo are also raised.

Distinction Between Northern and Peninsular Rivers

It is necessary to distinguish between the Himalayan rivers and the Peninsular rivers. The Himalayan rivers have a flow of water throughout the year, though in winter the discharges are low. Even in summer the rivers receive water from the melting of the Himalayan snow. During the rainy season, the rivers swell further and carry enormous floods. Flowing through the broad basins they form large tracts of rich alluvial soil on either side. It is no wonder, therefore, that their fertile basins are

the natural granaries of the country. The Ganges and the Brahmaputra are navigable and provide excellent water-ways for commerce. The irrigation works of the East Punjab, Bihar and U.P. depend absolutely on these rivers and their tributaries.

The Peninsular rivers, on the other hand, have water during the monsoons, but shrivel into muddy pools in the dry season.

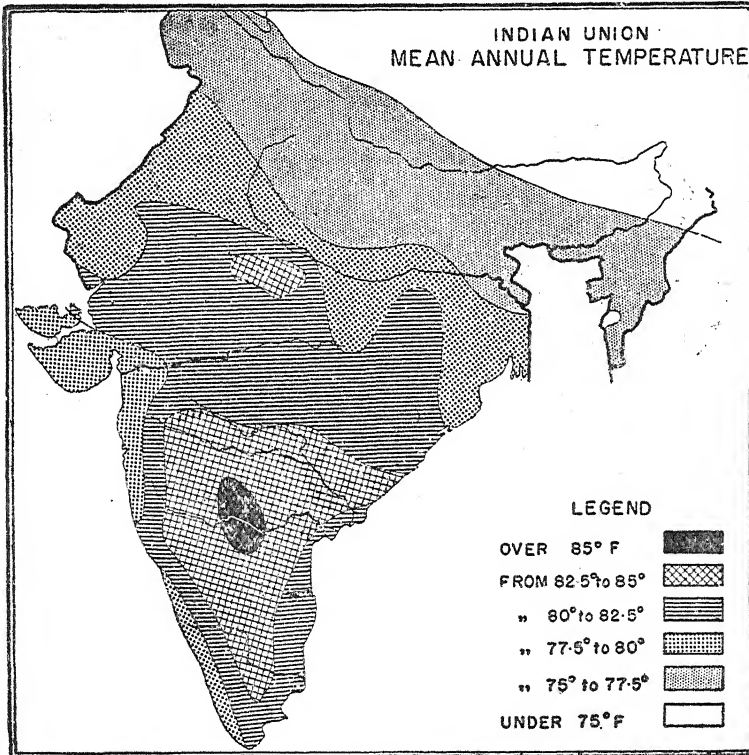


FIG. No. 3

These rivers have no snow-fields at their heads. These rivers are of little use for navigation on account of their torrential nature in the upper courses, and the rapids that occur where they descend into deep gorges from the tableland to the coast plain. With the exception of the Mahanadi, the rivers of Peninsular India are never useful as carriers of commerce.

The Climate of India

India is so vast in size and so varied in topographical features that a uniform climate does not prevail all over the country. On the whole, the climatic conditions of India though enervating, are not unfavourable for the development of a high

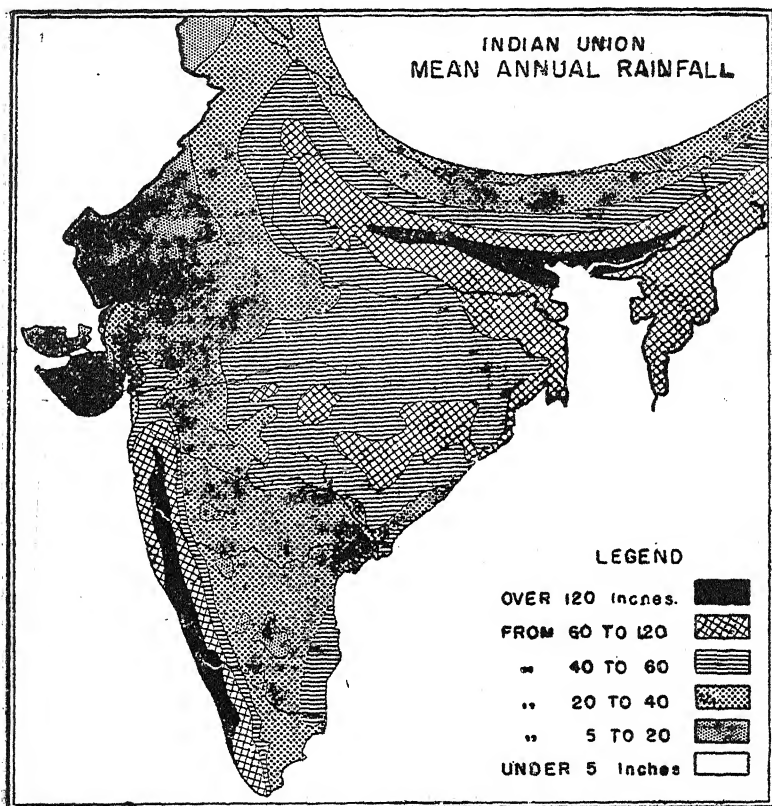


FIG. No. 4. The normal rainfall varies from an average of 460 inches at Cherrapunji in Assam to 5 inches in Rajasthan, the average for the whole country being 42 inches.

level of civilization. For the purpose of climatological studies it is useful to divide India into two parts—Peninsular India and Northern India. Peninsular India has the characteristics of a tropical climate. The temperature is uniformly high and its seasonal variation relatively low.

Northern India lies beyond the Tropic of Cancer. In this region climatic conditions are never similar in all the places. The western side is very hot in summer and very cold in winter. Air is generally devoid of moisture. But in the eastern side winter is mild and summer is hot with plenty of moisture in the air. The western side includes East Punjab and Rajputana. The eastern side embraces West Bengal, Assam, Bihar and the U.P.

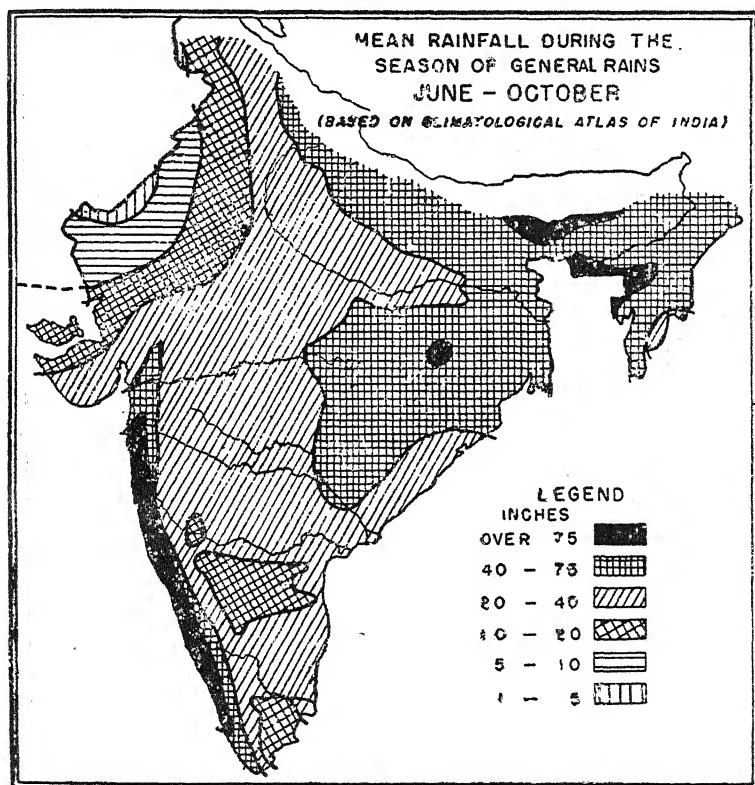


FIG. No. 5. The major portion of the rainfall comes during the South-West Monsoon period from June to October except in the south-east part of the Peninsula.

Monsoon is the most important factor in the climate of India. The word "Monsoon" comes from the Arabic word "Mausim" (meaning season) and in India monsoon means the rainy season. There are two Monsoon currents—The South-West

Monsoon and the North-West Monsoon. The South-West Monsoon, blowing in-shore, carries with it particles of water and gives rain from June to September. The South-West Monsoon contributes nearly 90 per cent. of the total rainfall in India and reaches the country in two currents—the Arabian Sea current and the Bay of Bengal current.

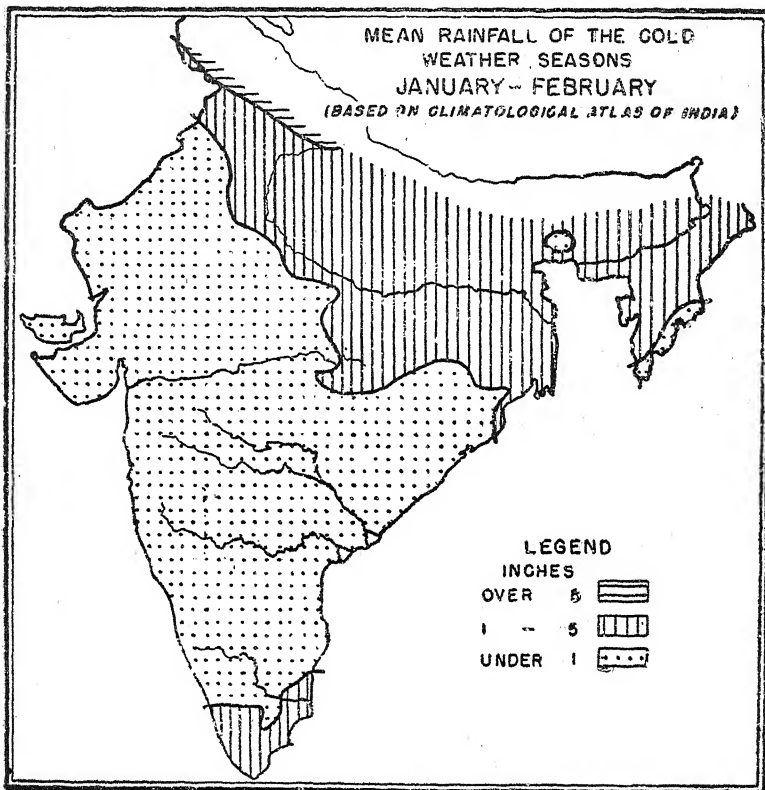


FIG. No. 6. During January-February, the precipitation in North India is due to the north-east Monsoon. It is scanty but essential for the production of *rabi* crop.

The Bay of Bengal monsoon current, after being obstructed by the Arakan mountains and the Shillong plateau on the east, and the Himalayas on the north, proceeds westward up the Gangetic plain and causes copious rainfall in Assam, Bengal, Bihar and the U. P. *The Arabian Sea monsoon*, after surmounting

the Ghats and giving rains to the Deccan and C. P., meets the Bay of Bengal current in Bengal and Assam. This combined monsoon is responsible for heavy rainfall in Bengal and Assam.

The South-West monsoon begins to retreat from Northern India in the early part of October, and the retreat becomes complete by mid-December. "This retreat is associated with dry weather in Northern India but with more or less general rain on the coastal districts of Madras and over the eastern half of the Peninsula."

The *North-East* wind begins in January and lasts till March. At this period dry winds from the belt of high pressure in Central Asia (from the West Mediterranean to Central Asia, and North-East China) pass eastward to Persia and Northern India and cause light rain in Northern India, particularly in the Punjab plains. This rainfall, though scanty, is very important for the *khari* crops. Another current of cold winds after crossing the Eastern Himalayas moves towards the Madras coast and Ceylon, and gives rain to these areas.

The average annual rainfall in India is 42 inches and the variations from this normal rainfall are surprisingly great. The overall departures from the normal are as great as +12" and -11". These variations affect the growth and yield of crops adversely. Again, the distribution of rainfall in India depends largely on the physical features. "If the hills and mountains of India were effaced, the country would receive much less rainfall and would not be able to support its present population."*

The economic importance of rainfall in India is of the highest order, inasmuch as rainfall is an imperative necessity for agriculture. The prosperity of most Indian districts depends on the success or failure of the monsoon, and a very slight variation in the direction of the west winds may cause a usually well-watered district to become a desert.

• One of the chief characteristics of rainfall is its unequal distribution over the country. Some Indian provinces always obtain abundant rains, and some never get more than an inch or two per annum, whilst over large areas the rainfall is uncertain. *It is not the average rainfall of any province, but the deviation from the normal average, together with its timely distribution,*

* Normand, *The Weather of India*.

that may cause disaster. A deficiency in the expected rainfall causes famine, and too much rain spoils the crop, while the early or late arrival of the monsoon may spoil the harvest.

The most useful classification of areas, according to rainfall, is made into two great zones,—‘*certain*’ and ‘*uncertain*’. The zones of *certain rainfall* include Bengal, Assam, the West Malabar Coast, the Western slopes of the Ghats and the Upper valley of the Narmada.

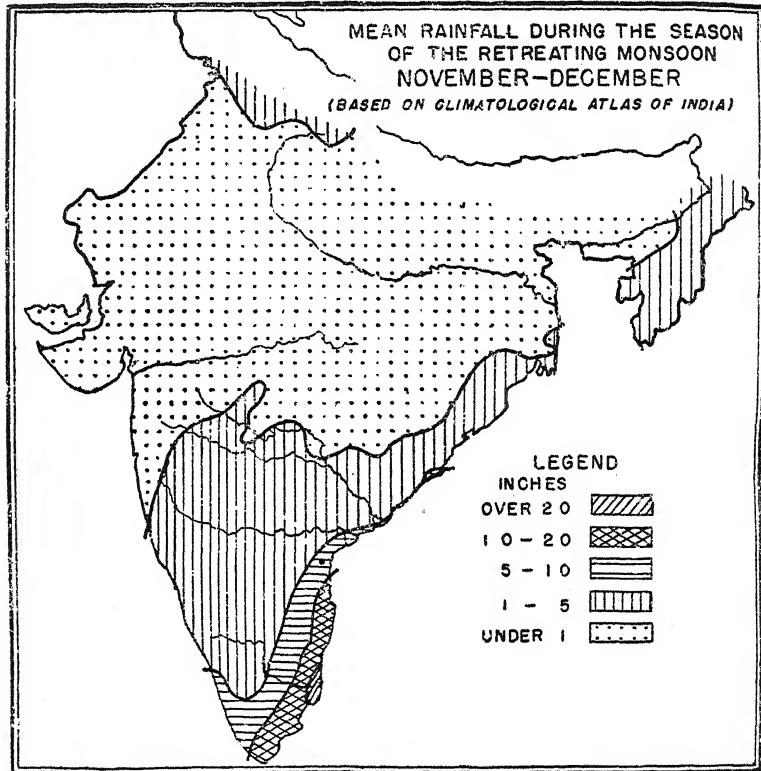


FIG. No. 7. The south-eastern parts of the Peninsular India receive sufficient precipitation during November and December.

The zones of *uncertain rainfall* include the U.P., Western and Northern Rajasthan, the Central Rajputana plateau bordering on the U. P., a large part of the Bombay State, the whole of Madras (except the actual slopes of the Eastern Ghats).

South and West Hyderabad and Mysore and some districts of Bihar and Orissa.

The existence of these extensive zones of uncertain rainfall has been the cause of India's famines.

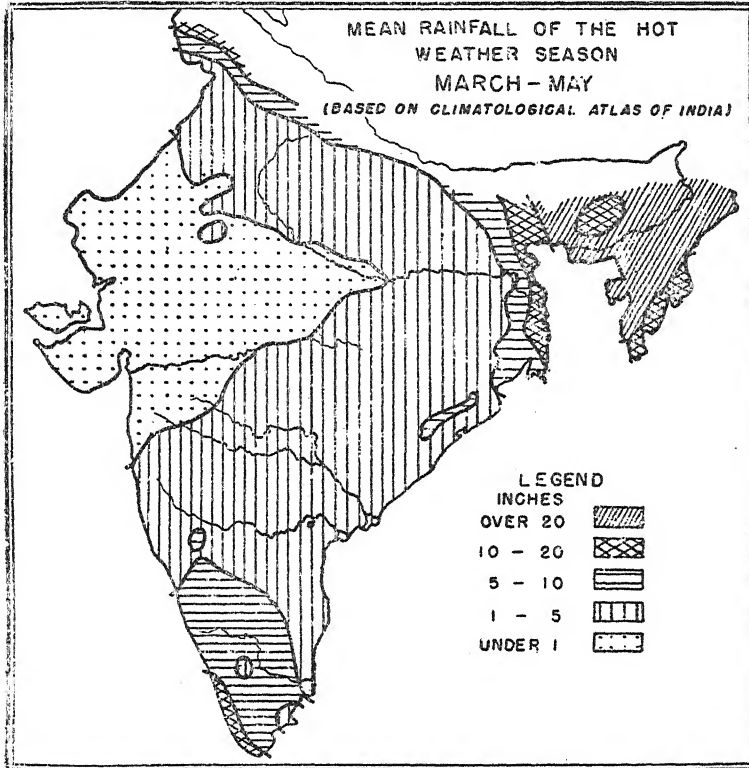


FIG. No. 8. Assam, eastern border of West Bengal and the narrow coastal strip in Travancore and Cochin receive abundant rain in March-May.

The Control of Famines: We cannot control rainfall in which either deficiency, irregularity or super-abundance may give rise to disastrous famines. We can, however, provide measures to reduce famines. Chief among these are promotion of railways, extension of irrigation, reclamation of waste land, agricultural improvements such as cultivation of proper crops and introduction of a scientific system of rotation of crops and, where necessary, revision of the revenue and rent systems. Therefore,

although droughts occur frequently in the interior districts of India, the result is not necessarily famine.

Soils and Soil Regions

A productive soil is the most important factor for successful agriculture. Soils differ in their capacity to produce crops. Some

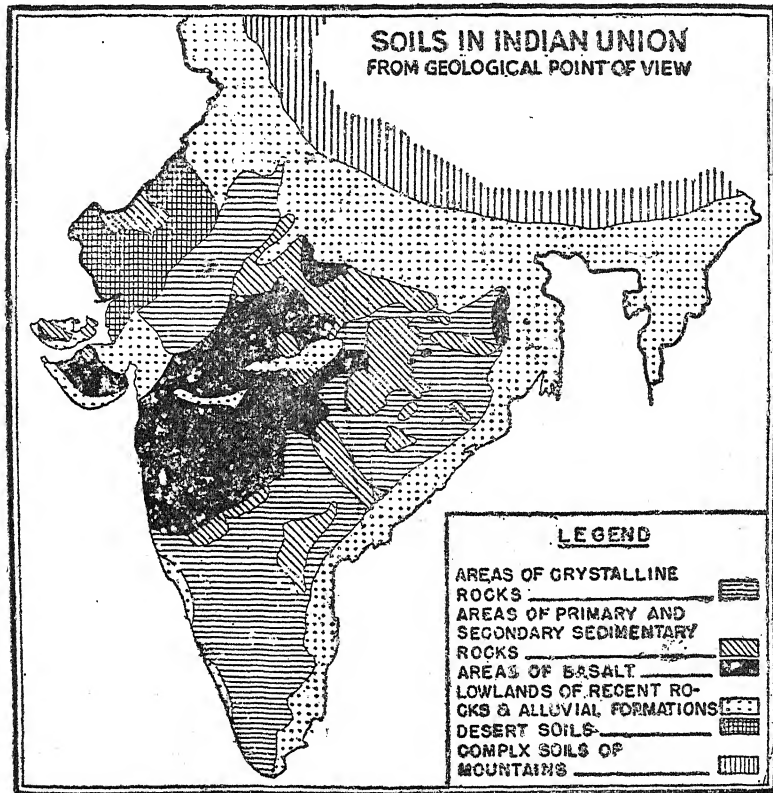


FIG. No. 9. Soils in India play a great part in the development of agriculture and the distribution of population.

are fit for profitable agriculture, others are impoverished by soil-depleting practices; and still others are poor to start with but made fertile by efficient management. The various types of soil that are found in India have been influenced in their formation by the wide diversity in geology, topography and rainfall.

On the whole soils in India are good in quality. Only in limited areas can they be rated as bad from the point of view of fertility.

Since there has been no systematic soil survey of India, it is very difficult to give a correct description in regard to the composition and characteristics of Indian soils. However, eight soil regions are generally recognised in India some of which are quite inclusive of a rather wide variety of soil conditions while others have quite uniform and consistent soil characteristics throughout*

- | | |
|--|---|
| (i) Alluvial soils including deltaic, coastal and inland alluvium. | (iv) Laterite soils. |
| (ii) Black soils including the regur and shallow grey black soils of M. P. | (v) Mountain and Hill soils. |
| (iii) Red soils including red loams and yellow earths. | (vi) Terai soils. |
| | (vii) Arid and Desert soils (84,000 square miles). |
| | (viii) Peaty and other organic matter (3,000 square miles). |

Agriculturally the most important soils are the alluvial ones which occupy extensive tracts of land, and include the greater part of Gujrat, Rajasthan, East Punjab (entire areas of Amritsar, Ferozepore, Hissar, Gurgaon, Rohtak, Karnal, Ambala, Ludhiana and Jullandur), the Uttar Pradesh, Bengal, the Godavari, Kistna and Tanjore districts of Madras, Bihar and Assam (entire areas of Lakhimpore, Darang, Kamrup, Goalpara and parts of Garo hills and Sibsagar). The eastern and western coastal lands of the Deccan are lowlands of alluvial formations.

The alluvial soils are rich in chemical properties and are capable of yielding a large variety of *rabi* and *kharif* crops. In characteristics, these soils belong to the *Brown Steppe soil* group which is found in Russia, North America, Australia, Africa and South America—usually at the fringe of desert soils.

* We get the earliest information about Indian soils from the *Land Settlement Records*. The main factors which governed the system of classification for land assessment purposes are texture, colour, availability of water, level of the land and yield of crops. "The information is useful, but is insufficient and lacks a scientific background for efficient utilization of land." Soils in India were also studied from a geological point of view by the Geological Survey of India. In Sind and Punjab, soil surveys were made for irrigation purposes.

The alluvial soils of the Upper Ganges valleys are dry, porous and in some places sandy, yielding crops that do not need the retention of much moisture about their roots. At present in these areas cultivation has much developed with the help of irrigation. The level country and the absence of hills make it easy and comparatively cheap to make canals and distribute the water over the length and breadth of the country. The alluvial tracts of Bengal are more compact, less coarse and more moist than elsewhere and yield rice, jute, sugar-cane, tobacco etc., rather plentifully. The alluvial soils of the Deccan coastal strips are non-porous, clayey and of a dark colour.

The Black soils comprise the greater part of Bombay State, the whole of Berar, the western part of the Madhya Pradesh and the western part of Hyderabad. The soils of this region vary in different parts in character and productiveness. The soils are poor, thin and porous on the slopes and the uplands of the Deccan hills where millets and pulses are the main crops. In the lowlands, the soils are deeper and darker-coloured, suitable for wheat, millets and cotton. The most important soil in the Deccan trap area is the *regur* or *black cotton soil*, found mainly in the valleys of the Tapti, the Godavari, the Narmada and the Kistna and parts of Kathiawar, M. P. and the western portion of Central India. "This soil is the product of the decomposition of lavas. It is of a dark colour and is exceedingly compact and tenacious. It is highly retentive of moisture and rich in chemical properties." Cotton, jowar, wheat, linseed and gram are cultivated in these areas.

Red Soils comprise the whole of Madras, Mysore, and South-east Bombay and extend through the east of Hyderabad and the Madhya Pradesh to Orissa and Chotanagpur. It is also found to occur in the Santhal Parganas and the Birbhum district of West Bengal, the Mirzapur, Jhansi and Hamirpur districts of the U. P., Madhya Bharat and eastern Rajputana. The consistency, depth and fertility of the soil vary widely in different areas. The poor, sandy and light-coloured soils of the arid uplands yield only bajra, while the rich, deep, bright-red fertile loam of the plains produces a wide range of excellent crops. "Red soils are deficient in nitrogen, phosphoric acid and humus, but potash and lime are generally sufficient." Although the red soil tracts are drained by the Mahanadi, Godavari, Kistna and Cauvery, the use of water

by means of canals for irrigation is absent because of the uneven surface except at the deltas. The construction of wells is difficult because of the rocky nature of the surface. The red soil areas are, however, admirably suited for storage of rain water in tanks. In Madras, Mysore and Hyderabad, cultivation is carried on with the help of tank irrigation.

The Laterite soil is found in Madhya Bharat, Assam and along the Western and Eastern Ghats. The soils are formed by the weathering of laterite rocks. "The distinguishing peculiarity of these soils is their acidity, and the main agricultural problem is the correction or amelioration of this acidity." Since the tea-plant requires acidity, tea-plantation is common in these areas. The laterite soil differs widely from one region to another. Generally speaking, they are poor on the higher levels and cannot retain moisture. In the plains, however, they consist of heavy loams and clays and can easily retain moisture.

Mountain and Hill soils are suitable for the growth of forests in the hilly parts of the north and specially Darjeeling, Almora and Garhwal districts. *Terai soils* are covered by tall grasses and shrubs of no agricultural value. These are found in a narrow strip in the Uttar Pradesh (U. P.) and Bihar between plains and hills including Nainital, Pilibhit, Kheri, Gonda, Basti and Gorakhpur. *Arid and desert soils* are found in Rajasthan and mostly contain sands, often with high soluble salt contents. These soils have very low organic matter. Certain parts of Cochin and Travancore contain *peaty and other organic matters*. *Sub-Montane soil* is confined to the whole of Simla, most of Kangra and part of Gurdaspur in East Punjab.

Problem of Soil erosion

For the successful agriculture in India, it is necessary to maintain a high fertility level of the soil. In other words, soil conservation is essential to continued agricultural prosperity.

As the soil is usually six to twelve inches in depth, care must be taken in the proper use of land. Unfortunately, however, in India today many soils have become so depleted in fertility or so eroded that they are no longer suited to agriculture. Soil erosion is confined to Bundelkhund, Madhya Bharat, Bihar, parts of Bombay, Madras and East Punjab. In fact, soil erosion is an age-old problem.

The agencies of erosion are winds, water and waves of which, in India, the water erosion is most pronounced. There are three kinds of water erosion—*sheet, rill and gully*. Sheet or surface erosion takes place in the form of uniform removal of soil from the surface of sloping lands by rain-water. In the hill-tracts of Assam, North Bihar and Kumaun region of Uttar Pradesh, such loss of soil is steadily going on. Sheet erosion develops so slowly that its injurious effect is not noticed before serious damage is done.

Rill erosion is common in Bihar, Uttar Pradesh and parts of Madhya Bharat where rains cause formation of tiny gullies on bare soil. *Where such rills are enlarged, they are known as gullies*. Such gullies not only take away the surface soil but also sub-surface and sub-soil. Thus gullied lands are partially or completely abandoned by farmers although inter-gully areas are used for pasture.

In Pepsu, western parts of East Punjab and almost all parts of Rajasthan, top soil is removed by the actions of winds. From April to July, wind hurls sands from the western Rajasthan and covers not only the surface soil but also injures the plants with its abrasive actions. Wind erosion is a quick process and can take land out of cultivation in a short period of time. The progress of the winds can be arrested by planting trees.

Soils vary in their resistance to erosion. A coarse soil can resist erosion because it can absorb the rains rapidly. Erosion is also influenced by the slope of land. The slope determines the rate of flow of water over a surface. The speed of water in its turn determines its power of eroding.

The Government of India is taking a great interest in land use as a national problem and has prepared sound programmes for the control of soil erosion. Already in many parts of Northern India, soils which were poor to start with, have been made fertile and brought into production.*

* Roychaudhury and Mukherjee of the Indian Agricultural Research Institute have classified Indian soils as follows: (i) alluvial soil, (ii) alluvial soil impregnated with varying amounts of salts, (iii) coastal sandy alluvium, (iv) old alluvium, (v) saline and deltaic soil, (vi) calcareous soil, (vii) deep black soil, (viii) medium black soil, (ix) shallow clay loam, (x) mixed red and black soil (xi) red loam, (xii) red sandy soil, (xiii) mixed red loam and red sandy soil, (xiv) gravelley soil, (xv) sub-montane soil, (xvi) Terai soil, (xvii) marshy land, (xviii) Peat soil, (xix) desert soil. (Vide *Journal of Scientific and Industrial Research*, October, 1947).

QUESTIONS

1. Account for the variety in the distribution of rainfall in India, and show its effects on the chief products. (Cal. Inter, 1941).
2. Divide India into natural regions. Describe the climate, products and industries in each of them. (Cal. Inter, 1938, W. B. C. S., 1949).
3. Describe the economic importance and give a geographical account of the Ganges Valley. (Cal. Inter., 1940; I.I.B., 1934).
4. How do the monsoons affect the economic condition of India? (Cal. Inter., 1933).
5. What are the monsoons? Describe briefly their effect on the economic conditions of India. (Cal. Inter., 1931; B.Com., 1947).
6. Explain how far the physical environment of Indian Union has influenced the industrial and commercial activities of the people.
7. Write a note on the types of soil found in India and their importance to Indian agriculture.
8. What are the problems of soil erosion in India?

CHAPTER II

THE DISTRIBUTION OF POPULATION

The most decisive productive force of a country is its distribution of population. The extent of utilization of the natural resources is much determined by the character and density of population.

The people of India are highly intelligent, enterprising and peace-loving. Their civilisation dates back to some 5,000 years before Christian era. In art, literature, science, architecture and industry, the people achieved fame at a time when the rest of the world was almost dark. The vitality of the people of India has made itself felt in Burma, Ceylon, Malaya and Indonesia where we find a large number of Indians as immigrants. The Indians have shown to the world that peoples of different races, languages and religions can live side by side in peace and unity when the rights of all are treated with tolerance and respect.

India is one of the most densely populated parts of the world, containing as she does nearly one-fifth of the world's total population. The population of Indian Republic is 356,829,485 according to the census of 1951.*

In proportion to the area of the country and specially the area available for cultivation, the density of population per square mile in India is amongst the highest in the world. The arithmetic density of population in the country is about 217 per square mile. This *man-land* ratio does not give an accurate measure of real density. Equal areas vary greatly in their capacities and resources for supporting population. The index of population density can be accurate if it can be shown *per square mile of productive land of an area*. The productivity of land depends on climate, soil, configuration, vegetation and mineral resources. The density of population can also be measured in terms of arable land which is known as *physiological density*. In India the density of popu-

* The census operations in 1951 covered the entire country except Kashmir and Jammu and the part B tribal areas of Assam. The census estimated the total population at 356,829,485. Population figures of Kashmir-Jammu and tribal areas of Assam were added on the basis of 1941 census.

lation per square mile of arable land is about 500. For an agricultural country such density is too high specially when the yield of crops are also low compared with the Western countries.

GEOGRAPHICAL DISTRIBUTION OF POPULATION

States	Area in square miles	Population 1951 (000,000)	Approximate density per square mile
STATES (<i>i.e.</i> , provinces)			
Assam ...	54,084	9.1	186
West Bengal ...	29,476	24.32	800
Bihar ...	70,368	40.2	550
Orissa ...	59,869	14.41	300
Bombay ...	115,570	35.9	300
Madhya Pradesh ...	130,232	21.7	170
Madras ...	127,768	56.9	400
East Punjab ...	37,428	12.61	190
Uttar Pradesh ...	112,523	63.62	600
Rajasthan ...	128,428	15.2	...
Sourashtra ...	21,062	4.1	...
Madhya Bharat ...	46,710	7.87	...
Hyderabad ...	82,313	18.6	200
Kashmir ...	82,528	4.37	50
Cochin and Travancore ...	9,155	9.2	900
Mysore ...	29,458	9.06	250
Pepsu ...	10,099	3.32	...
Himachal Pradesh ...	10,600	1.0	...
Vindhya Pradesh ...	24,600	3.6	...
Delhi ...	574	1.7	...
Manipur ...	8,620	0.6	...
Kutch ...	8,461	0.6	...

A noticeable feature in connection with the population in India is the rapid growth of its numbers. The annual increase of population in the country is about 1 per cent. If this rate of growth keeps up, every year there will be an additional 3 million people.

The density of population depends largely on the external environment of a region. Climate, soil, natural resources, topography etc., largely determine the number of people a given territory can support. In India the density of population generally varies with the amount of rainfall. Population is thick in those places where the rainfall is not only heavy but certain as well. West Bengal, Bihar, the U. P. and Orissa are densely populated, because they possess fertile soil, level land and rainfall

sufficient for the development of agriculture. But unhealthy regions like the *Sundarbans* in the Lower Gangetic delta cannot attract people although these regions receive heavy rain. There are areas in India where rainfall, though scanty, supports a large population with the help of irrigation. The western parts of the U. P. have been developed by irrigation.

Mountains cannot attract people for settlement. Land is limited for cultivation, and roads and railways are very difficult to construct; rivers are swift-flowing and are, therefore, useless for navigation. Thus the Himalayan region has only 21.4 million population in 153 million acres of land.

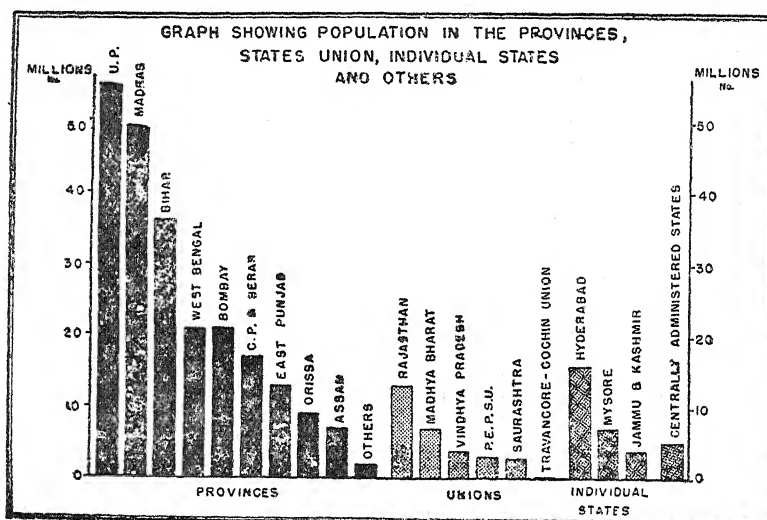


FIG. No. 10.

The density of population is also determined by the economic progress of a country. In Europe and North America, the density of population is great in urban and suburban districts and is usually a sign of progress made in mining or industrial or commercial occupations. In India nearly 86 per cent. of the total population is, in the main, village-dwelling. This is because agriculture is the mainstay of the great majority of the people. Eastern Punjab, the Upper Ganges basin, the Lower Ganges basin, the Eastern marginal plain, the Western marginal plain and the South Eastern plain are the most densely populated parts of

India. In all these areas agriculture occupies a preponderant position. There are 139 million population in the Northern Plain region, 40 million in the western coastal region and 52 million in the eastern coastal region.

The first population census was taken in 1871. Since then every census has revealed a rapid rate of increase in population. Between 1931 and 1941 there has been an increase of 50 million people in India. This rapid growth of numbers has created a difficult situation because production has not been able to keep pace with the increase of population. India is now faced with the problem of over population that stands in the way of national development.*

The problem of increased and increasing population in industrial countries is solved by a readjustment of population in the different areas of the same country, reclamation of lands, better utilization of economic resources, growth of manufactures, expansion of foreign trade as well as by emigration.

In India there are always some shifts of population from agriculturally congested areas to industrial areas. Every year Bihar, Orissa, Uttar Pradesh and Madras send out a large number of persons to other States where they are employed in factories, plantations and mines. Assam, Bombay, West Bengal, and Madhya Pradesh receive the majority of these emigrants.

MOVEMENT OF POPULATION† (1931)

States or Provinces which send out emigrants	Gain or loss per 1000 of the population
Bihar and Orissa	. -37
United Provinces (Now Uttar Pradesh)	. -21
Madras ...	.. -20
Assam	.. +144
Bombay	+ 18
W. Bengal ..	.. + 26
Central Provinces (Now Madhya Pradesh)	+ 13

* "Misery exists in India neither because the nation is overrun with people nor because her soil is saturated. The true causes have to do with inadequate exploitation of resources both material and human." J. D. Castro, *Geography of Hunger*, Victor Gollancz Ltd., London, p. 154.

† R. Mukherjee: *"Food Planning for 400 millions."*

A large number of emigrants from Bihar, Orissa, the Uttar Pradesh, Madhya Pradesh and Nepal have settled in West Bengal. Of the total immigrants who have settled in West Bengal from other provinces, about 60 per cent. is from Bihar and Orissa and 18 per cent. from Uttar Pradesh. These people are mostly employed in the mills and factories on the Hooghly basin and in the tea-plantations of the Darjeeling district.

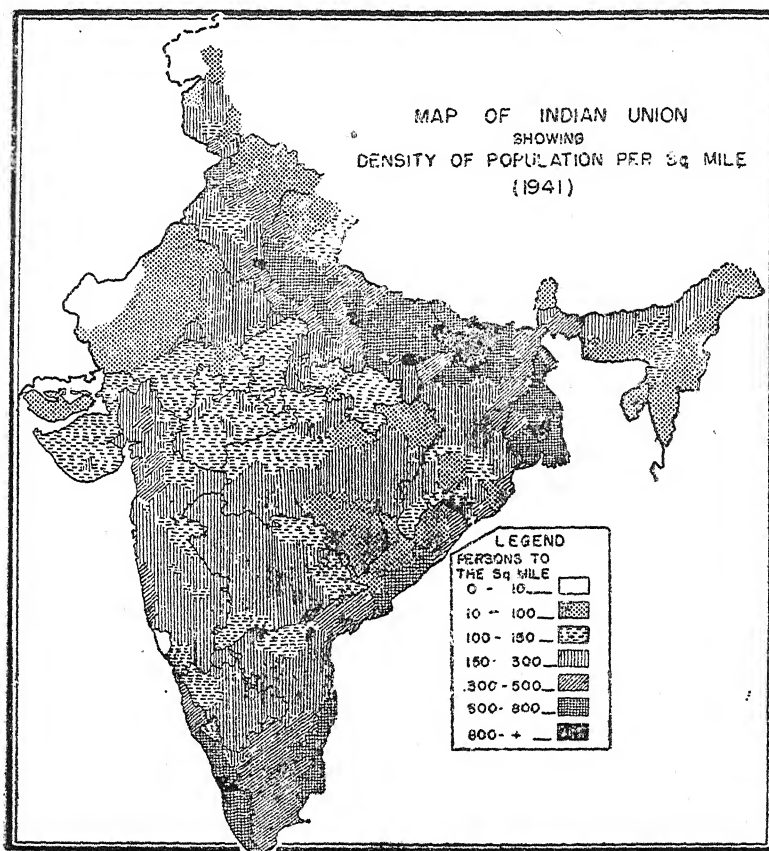


FIG. No. 11. The density of population in Undivided India. Notice the great density of population in the Ganges valley and Travancore.

Tea-plantations and large tracts of cultivable lands of Assam have attracted many immigrants there and today these people form about one-fourth of the total population of the province.

For tea-plantations the recruiting grounds are Bihar, Orissa, Madhya Pradesh and Madras. In the pre-partition days, many peasants from Mymensingh and Comilla (now in Pakistan) migrated to Assam and settled in Nowgong district. Although Assam is a big State and contains comparatively a sparse population in relation to many other States in India much of the area is covered by forests and hills. About 39 per cent. of the area is forested. Besides, some of the areas are highly malarious. Until all such areas are properly reclaimed, Assam in its present stage of economic development may not encourage immigration of persons from other States.

It is very difficult to say how far the problem of over-population in India can be solved by encouraging emigration of Indians to other countries. Emigration outside India as a measure of population relief is after all a matter dependent entirely on the attitude of the countries that could absorb such surplus. At present above four million Indians live outside India, of whom 186,000 are in the non-Empire countries. Nearly 75 per cent. of the Indian emigrants live in Burma, Ceylon and Malaya. The majority of them are employed as labourers on sugar and rubber plantations and in mining. In periods of agricultural depression generally the number of emigrants necessarily increases. According to the 1931 census the Indian population in Burma was a little above one million or 6.9 per cent. of the total population of Burma. Recently the competition between Indian and Burmese labour in ports and dockyards as well as on rubber plantations has increased so much that there is already an anti-Indian feeling in that country. The Baxter Commission was appointed to study the whole question of immigration. Since 1941 Indian immigration into Burma has become subject to regulation and restriction.

Ceylon has nearly 28 per cent. of the total Indian emigrants, forming, as it does, about one-seventh of the total population of Ceylon. They are mostly engaged on the tea and rubber plantations. The emigration of Indian labour to Ceylon has declined in recent years because of low wages offered to the Indians. There is also a growing opposition against the settlement of Indians in Ceylon. Malaya contains 15 per cent. of the Indian emigrants whom it engages in mines and plantations. Before the outbreak of the Second World War, Malaya protested vigorously against the immigration of Indians. Besides, it appears

that both Ceylon and Malaya have reached the saturation point and cannot absorb any more Indian labour.

Nor is the position of the Indian labour better in Australia and South Africa. In the early stages of its economic development, South Africa had to invite Indian labour for work on railway construction and in mines. In South Africa, there are 220,000 Indians (the great majority of whom were born in that country) consisting of labourers, traders and professional people. The South African Government now does not want Indian immigrants because of the problem of competition with white men for land

PERCENTAGE IN THE TOTAL EMIGRANTS FROM INDIA

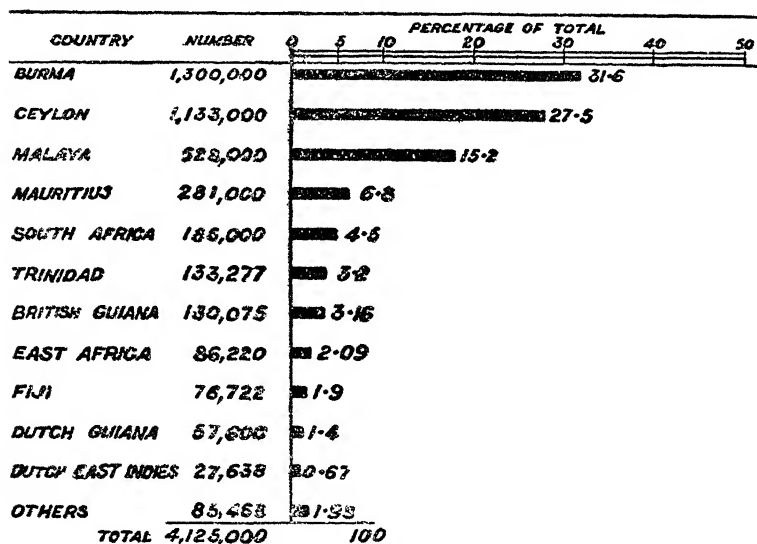


FIG. No. 12. The table refers to 1938-39 position. About 60 per cent. of the emigrants were in Burma and Ceylon.

and employment. The white settlers of South Africa find that the Indians are ready for and eager to do their work at far lower rates of pay. The present policy of the South African Government is, therefore, to curtail civic rights of the Indian immigrants, "restrict their opportunities of acquiring land outside well-defined areas, and limit their choice of employment for the sake of saving 'white South Africa'."

Australia has an area of 3,000,000 square miles with a population of hardly 7 million, the bulk of which lives in a narrow belt running from a little north of Sydney round the coast of Adelaide and in the south-west corner. The density of population is nowhere high. There is opportunity, therefore, for the population to increase many times its present figure. Indeed, the lack of labour is a handicap to the development of Australian industries. The Australian Government has, however, put restrictions on the immigration of Asians on economic ground.

This policy of discrimination in South Africa and Australia acts as a menace to the continuance of feelings of amity and harmony between members of the same Commonwealth. In the Commonwealth and Empire six of every seven persons are non-whites, and therefore, it is desirable that this problem should be faced and solved by honest efforts.

Many of the Indian emigrants are now returning to India. Between 1931 and 1939 about 900,000 emigrants returned to India as against 300,000 who left India during the same period.

It is evident from an examination of these facts that the problem of population in India cannot be solved by emigration to foreign lands. The measures should include reclamation of waste land, agricultural colonization of undeveloped lands and further progress in industrialization. Reclamation of land in Madhya Bharat, Madhya Pradesh and Orissa will help settlement of people and extension of agriculture. A re-adjustment of population in the States may also be possible to remove the present disparity.

Illiteracy, high death rate, low life expectancy, low standard of living and disease are other social evils which are also connected with our problem of population. About 15 p.c. of the population are illiterate; 123 per thousand infants die at birth; Life expectancy is 27 years compared to 65 in Japan, 66 in U.K., 65 in Canada and 69 in Holland; average per capita income in a year is \$57 against 1,500 in U.S.A., 700 in U.K., 900 in New Zealand, 700 in Australia, 900 in Canada, 800 in Switzerland. Communicable diseases are very common in India as their source is the man himself which he transmits to others either by respiratory or digestive tracts.

Races

India is the only country in the world which contains a great diversity of races at every stage of civilization. It is because various races came from outside from time to time and settled in India.

(i) The *Negroid* or *Negrito* race was the oldest to settle in India from Africa. This has now almost disappeared on the Indian mainland, but traces have been found in the Rajmahal Hills. The Andamanese belong to the Negrito race.

(ii) Next came the *Proto-Australoids* from Palestine. They were long-headed, dark-skinned and snub-nosed. The aboriginals of Central India, Madhya Pradesh and Ceylon belong to this race. These people are the genuine and real ancient Indians. They are named Proto-Australoids because if we compare them with 'the aborigines' of Australia we find that in the shape of the head and face, the form of hair and skin colour, they are essentially alike.

(iii) The *Austrics*, a branch of the Mediterranean race, came through Mesopotamia in pre-historic times. They were long-headed, comparatively fair, and straight-nosed. They settled in North India. Later they migrated to Burma, Indo-China, Malaya and Indonesia. They are found today in the hills and jungles of Central and North-Eastern India, and they form about 1.3 per cent. of the total population of India. The Kols, Santhals, Khasis, Nicobarese belong to this race.

(iv) The *Dravidians* came to India before 3,500 B.C. from the Aegean Islands and Asia Minor. These people were highly civilised and built many cities in Sind and the Punjab. As they migrated towards the south and the Gangetic plain, they came in touch with the Austrics and absorbed a large amount of their blood. "They with the Austrics supplied some of the fundamental bases of Hindu religion and civilization." At the present day, the Dravidians live mostly in Peninsular India and form 20 per cent. of the Indian people.

(v) Next came the *Aryans* from the Northern Mesopotamian regions about 2,500 B.C. *via* Iran. They had white skin, finely-cut noses and were tall. Today they account for 73 per cent. of the population of India and occupy chiefly the East Punjab, Kashmir, Rajputana and Western U.P. Because of the topo-

graphical conditions of India, the races which came earlier were not annihilated by the new settlers, but every incoming wave of conquerers pushed them down south and eastward.

(vi) The *Mongoloid* race came after the Aryans. "They appear to have spread from their primitive home in North-Western China about the middle of the first millenium B.C. into Tibet, and in the subsequent centuries they penetrated through the Himalayas and through Assam into the Himalayan regions and the plains of North and East Bengal and the hills and the plains of Assam." These people occupy Nepal, Tibet, parts of Eastern Kashmir and Assam. They have yellow skin.

There has been great intermixture, and pure racial characteristics are hardly to be found. The *Aryo-Dravidians* are a mixed race of Aryans and Dravidians. They occupy the Uttar Pradesh, Bihar, Central India, Bombay, M.P. and parts of Western Bengal. The *Mongolo-Dravidians* are a mixed race of Mongols and Dravidians. They occupy the eastern parts of Bengal and Assam. They have dark complexion, medium height and broad noses. The *Scytho-Dravidians* are a mixed race of Scythians and Dravidians. They are found in Gujrat and Western Deccan. The Mahrattas are of this type.

Languages

India is a land of many languages. According to the Linguistic Surevey of India, there are 179 languages of which 116 are current among less than one per cent. of the entire population of the country. When we take into consideration the language of the large, advanced and organised communities, we find only 14 major languages in India.

LANGUAGES AND POPULATION

	Million		Million
Hindi	79	Sindhi	4
Bengali	54	Assamese	2
Marathi	21	Kashmiri	1.5
Punjabi	16	Malayalam	10
Rajasthani	14	Kanarese	12
Oriya	11	Telugu	26
Gujrati	11	Tamil	20

Punjabi and Nepali agree very closely with Hindi, while Oriya and Assamese are very much like Bengali. The last four are the languages of the South. The first ten language are spoken by 230 million people and the last four by 66 million in Indian Union.

This multiplicity of languages is no bar to nationhood. Some of the important States like Canada, South Africa, Spain, Czechoslovakia, Switzerland, China, Soviet Russia, the States of South America and Belgium have many languages, some of them having two or three court languages.

Too much emphasis, therefore, need not be given to the problem of languages in India. One can travel throughout Northern India and a good part of the Deccan also with a little knowledge of Hindi.

Both Hindi and Urdu are identical in points of grammar and syntax and can be regarded as really one speech, split into two, by two totally different scripts. Hindi is written in Devnagri script while Urdu in Persian-Arabic script. During the Moghal period when the Persian and Turkish-speaking Mohammedans met the Hindus in mart, in camp or in the battlefield, the former in order to make themselves understood had to use a mixed dialect, as they had naturalised some words of the language of the Hindus. The Hindus, on the other hand, had adopted some of the expressions of the Mohammedans. Hindi has been declared as the national language of the country as it is a great unifying force because of its simplicity in the matter of expression. However, all regional languages are allowed to grow side by side. English will continue to be used for all official purposes for a further period of 15 years.

QUESTIONS

1. Account for the uneven distribution of population in India. Is this unevenness a permanent feature?
2. India has a population of about 350 millions. Analyse the factors which determine the irregular distribution of population in India. (Cal. Inter., 1940, 1942).
3. Account for the great concentration of population in the Indo-Gangetic plain.

CHAPTER III

AGRICULTURAL PRODUCTION

Of the total area of the Indian Republic, the total land available for cultivation is about 358 million acres. Taking the total population of India at 357 million, the land available for cultivation *per capita* of population comes to 1.06 acres. The diagram below shows the present position of the country in respect of her land and its utilization.*

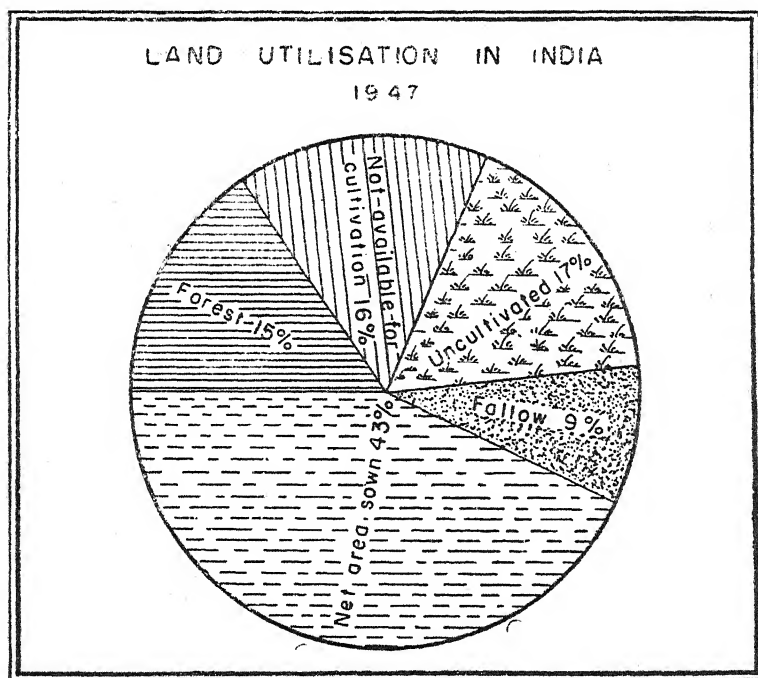


FIG. No. 13.

India is essentially an agricultural country where nearly 70 per cent. of the total population depend directly and another

* Geographical, economic and cultural factors control land utilization. The geographical factors are rainfall, temperature, soil and relief which

20 per cent. indirectly for their sustenance upon land. Thus agriculture is the single largest industry in India and it provides not only all the food grains and raw materials for inland consumption but also for export. As a matter of fact, India occupies a very important place in world trade as a supplier primarily of raw materials. *She is, to-day, the largest sugar-cane producing country in the world. In the production of rice, millets, tea, groundnut and linseed, her position is equally important. She holds a virtual monopoly in lac, follows the U.S.A. in cotton and Argentina in linseed, ranks with China and Africa as one of the chief millet-producing areas, and leads with China in the production of rice and tea.*

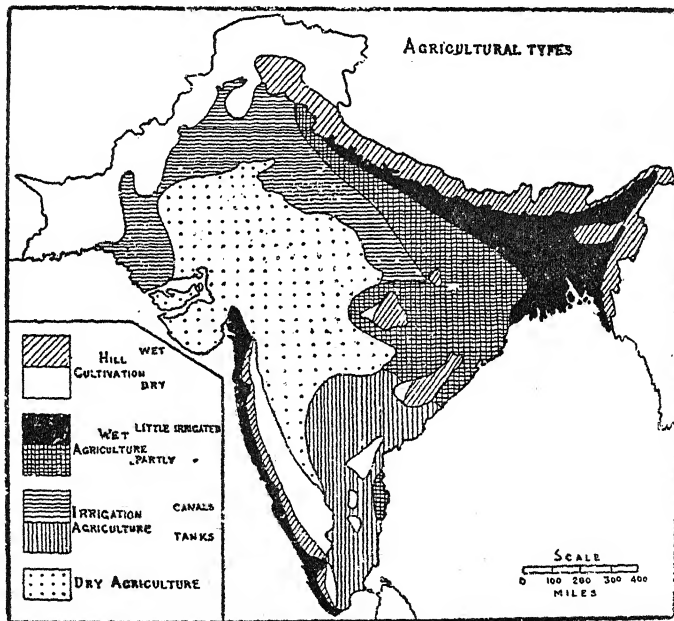


FIG. No. 14. More than 35 per cent of the total area of Undivided India is actually under cultivation. Wet agriculture is practised in the Ganges Valley and the Western Coastal Strip.

influence plant life. The economic factors are connected with transportation, density of population and the size of the market that can be supplied from a given area. The cultural factors include the stage of agricultural and industrial development, local prejudices, the system of land tenure and the Government policy.

The Indian Republic has 911.68 million acres of land of which *uncultivable area* covers 173.37 million acres.

Agricultural operations in India begin in June with the arrival of the monsoon. The crops thus raised in autumn as a result of the sowings made in June are known as the *Kharif* crops. The principal Kharif crops are wheat, rice, millets, maize and cotton. Another agricultural season commences in winter, the *products* of which are known as the *Rabi* crops. The principal Rabi crops are wheat, barley, gram, linseed, rape seed and mustard.

There are mainly four types of agriculture in India, *e.g.*, hill cultivation, wet agriculture, irrigation agriculture and dry agriculture. The variations are due to her topography, climate, soil and the type of population.

Cultivation is mostly confined to Madras, Bombay, West Bengal, the U.P., the East Punjab, Bihar, Orissa and the M.P. The areas where the cultivation of land is difficult are: (a) Eastern Bombay and the M.P.—high lands are generally infertile soil, excepting the black soil; (b) Assam—unhealthy climate in several districts as well as dense forests and mountains restrict cultivation to definite areas; (c) Rajasthan, an arid region where cultivation is extremely difficult; (d) the Himalayas where mountains prevent large-scale cultivation; (e) M.P. and Orissa border where malaria is highly prevalent. All the same, cultivation of land in these five areas is carried on in places which offer better conditions.

Many of our cultivable lands lie waste today because in the absence of roads, the farmer finds not only the cost of production high but also that of transporting charges. In France, U.S.A., Germany, U.K. and Israel, the agricultural prosperity came in the wake of road development. In India, however, many of the villages are even today in isolation.

YIELD PER ACRE IN LBS.

				Rice	Wheat	Linseed
Bengal	...	...	...	866	660	416
U. P.	...	...	...	645	725	359
Bihar	...	...	...	756	865	307
M.P.	...	...	...	705	429	180
Bombay	...	...	...	871	393	

The study of agricultural crops in India reveals that agriculture is a very old industry and the cultivators are intelligent

and hard-working—though illiterate and poor. But there are great differences in the agricultural conditions and practices that prevail in different parts of the country, which are due, in no small measure, to the differences in soil, climate, rainfall and methods of cultivation.

Another problem is that the *agricultural productivity of India is lower than that of the other important agricultural countries of the world.*

India gets 660 lbs. of wheat from an acre of land while Egypt obtains 1,918 lbs., Japan 1,713 lbs. and China 898 lbs. An acre of land produces four times as much rice in Italy and three times as much in Japan as in India. The average yield of sugar-cane in India is only about one-fourth of Java's. The table below indicates the yield of certain crops of India in comparison with other countries.

(lbs. per acre)

	Wheat	Rice	Maize	Sugar-cane	Cotton	Tobacco
Egypt ..	1,918	2,998	1,891	70,302	535	—
Japan ..	1,713	3,444	1,392	47,534	196	1,665
China . ..	989	2,433	1,284	—	204	1,288
Java ..	—	—	—	113,570	—	—
U.S.A. ..	812	2,185	1,579	43,270	268	882
India ..	660	1,240	803	34,994	89	987

It is also true that in large tracts of Europe and the U.S.A. the land yields more because it has been brought under cultivation comparatively recently. But then, China, where agricultural industry is as old as that of India, the average yield is comparatively high.

If the outturn of wheat alone is raised to the level of Egypt's, India can become self-sufficient for a number of years to come assuming that the annual increase of population is four million.

The third problem is the *maladjustment of food resources to the growing population of India.* The pre-war production of food-grains in India, even when supplemented by imports, fell short of the actual requirements of the country. In normal times there has always been a food deficiency for about 12 per cent. of the population in a year.

The outbreak of the War in 1939 brought about great expansion in the cultivation of various crops. The expansion.

however, did not take place in the right direction. Our food resources, for example, have not kept pace with the increase of population. Secondly, the agricultural resources were mostly exploited in the interest of the Empire. With the attainment of

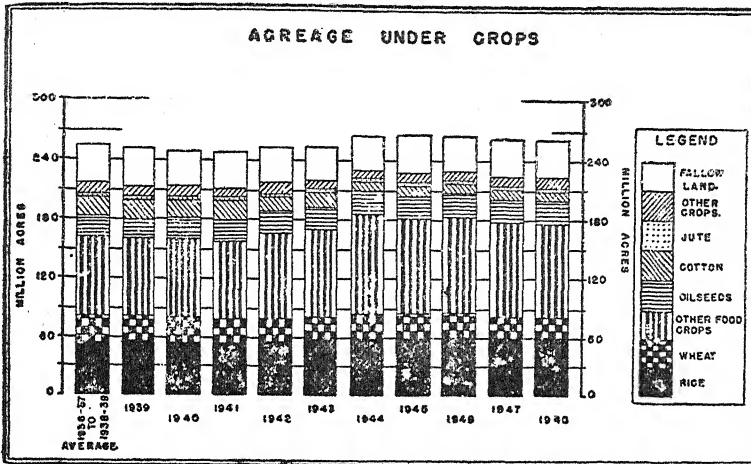


FIG. No. 15:

freedom, however, India has directed her agricultural expansion to meet the needs of the people in the shape of food and primary products.

AREA AND YIELD OF PRINCIPAL CROPS IN THE INDIAN REPUBLIC

A. Food and Beverage

	1950-51		1951-52	
	Area (in 000 acres)	Yield	Area (in 000 acres)	Yield
Rice (yield in 000 tons) ...	75,414	23,170	75,458	20,389
Wheat (yield in 000 tons) ...	24,114	6,290	23,983	6,590
Other cereals* (yield in 000 tons) ...	95,969	16,558	93,662	14,744
Gram (in 000 tons) ...	20,497	3,677	19,387	3,766
Groundnut (in 000 tons) ...	9,832	3,379	10,472	3,331
Sugarcane (Raw Sugar in 000 tons) ...	3,624	4,938	4,138	5,462
Tea (yield in million lbs.)	771	585		
Coffee (in million lbs.) ...	218	35	218	45
	230,439		227,318	

* Jowar, bajra, maize, barley, ragi and small millets.

B. *Non-Food*

	1950-51		1951-52	
	Area (in 000 acres)	Yield	Area (in 000 acres)	Yield
Cotton (yield 000 bales)	12,173	2,628	13,859	2,926
Jute (000 bales of 400 lbs.)	1,454	3,301	1,951	4,678
Other oilseeds* (000 tons)	15,053	1,763	15,508	1,738
Tobacco (000 tons)	860	264	839	251
Rubber	170	35		
	<hr/> 29,710		<hr/> 32,157	

Thus, food crops occupy about 86 per cent. of the total acreage under crops in the Union.

INDIA AND HER FOOD SUPPLY

Although India is one of the greatest agricultural countries of the world, her position with regard to food production is not at all satisfactory. The production of cereals in the Indian Union is at present about 43 million tons a year, which is just sufficient for six-sevenths of her present population. Moreover, the population of India is growing at the rate of one per cent. a year. At this rate India needs additional food of half a million tons of cereals every year. The total consumption on the basis of 16 ounces for the farming population and 12 ounces for others is estimated at 43·6 million tons. To this must be added about 5 million tons for seed and wastage. Before the World War II, the deficit could be made up by imports of rice from Burma and Thailand. These countries have now a very small exportable surplus because of political disturbances. West Punjab and Sind used to supply a considerable quantity of wheat. Now that the country is partitioned, India is deprived of nearly a million tons of wheat from Sind and West Punjab. Thus the shortage of food in India today is to the extent of 4 million tons a year.

* Linseed, rape and mustard, sesamum and castor seed.

India has to import food from U.S.A., Canada, Burma, Australia, Thailand and Pakistan.

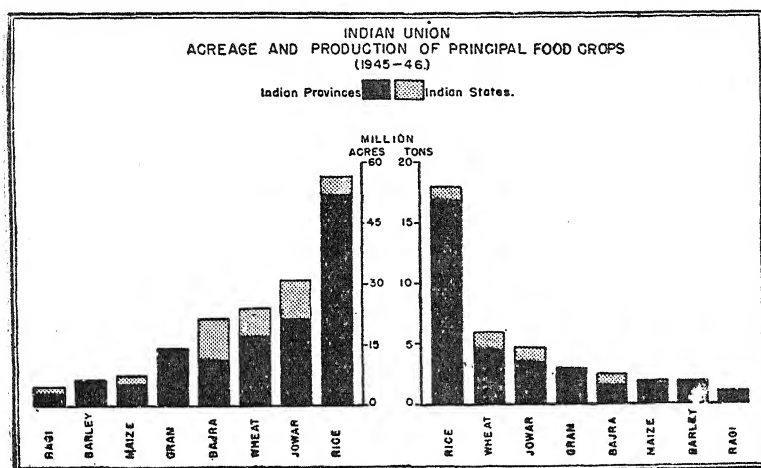


FIG. No. 16. Note the greater acreage under jowar and bajra in the States. Gram is an exclusive product of the provinces. Data from 'Agricultural Situation in India', 1948, issued by the Ministry of Agriculture.

IMPORT OF FOOD INTO INDIA

Year	Million tons	Value in crores of rupees	Year	Million tons	Value in crores of rupees
1946	2.25	76.14	1949	3.80	142.00
1947	2.33	93.76	1952	4.76	228.11
1948	2.84	129.59	1953	2.91	153.10

During 1953, U.S.A. (Rs. 54 crores), Canada (Rs. 23 crores), and Australia (9 crores) supplied wheat whereas Burma (23 crores) and Thailand (8 crores) supplied rice. The deficit of cereal production is about 10 per cent. of the present production. This deficit can be made up by reclamation of waste land, increased supply of water through irrigation, use of good seed, use of chemical manures, use of machinery to bring new or difficult land under cultivation and by anti-malarial measures to improve the health of peasants.* India has several million acres of cultivable waste

* The following four-point programme of agricultural development for India has been recommended by Mr. N. C. Dodd, Director General of F. A. O. of U N.: (a) Control of soil erosion by strict limitation of forest cutting,

land infested by mosquitoes and malaria. It is possible to make these areas agriculturally fit and malaria-free. Rice-growing areas in India are coincident with endemic malarial tracts. There are several tracts in India which are very fertile but have remained mostly uncultivated because of the hyper-endemic malarial conditions. Such tracts are (a) a horizontal strip of Sub-Himalayan tract—*terrai*, (b) a vertical strip along the Western Ghats and (c) a strip along the Eastern Ghats enlarging into a wide belt at the top merging into Madras, Orissa, Madhya Pradesh and Hyderabad. In all these areas, rice cultivation may be very profitable as the rainfall is between 50-100" per year. Malaria affects man but not the soil. Mosquitoes and rice plants are both sub-aquatic—one is aquatic fauna and the other is aquatic flora. They grow under the same conditions of high temperature, high humidity and heavy rainfall. It is possible to control mosquitoes and suppress malaria and to grow more rice to feed the country. Thus as a short-term programme, efforts should be made to increase the production of rice by controlling malaria.

To bring fresh land under the plough the Government set up a Central Tractor Organization in 1947. It has carried out some of the largest land reclamation operations in Asia. Thousands of acres of land in Madhya Pradesh, Uttar Pradesh and Madhya Bharat, infested with a pernicious weed known as kans, were cleared and made ready for cultivation.

The whole of the country in the south between the Ghats and the sea-coast from Goa to Cannanore can also be developed to yield food crops. This region is known as *Malnad*. The chief characteristics of the region are the following: (a) the rainfall is invariably over 60 inches; (b) the area is full of evergreen forests, (c) the density of population is below the average of 200 to 300 per square mile. The chief crops are paddy, betel nut, cardamom, pepper and coffee. In spite of the great geographical advantages of the Malnad area, it is at present in a backward position. The reasons are many; such as excessive rainfall, unhealthy climate, prevalence of malaria, inadequacy of communication and scarcity

(b) extension of tube-well irrigation, (c) greater use of clover crops for their nitrogen-restoring and water-holding properties rather than the extensive use of artificial fertilisers, and (d) limiting mechanisation to the breaking of new land and terracing to avoid soil erosion. Total mechanisation of Indian farming would be unwise as that would disturb the long-established agricultural practices.

of labour. If these problems are solved, Malnad will contribute substantially towards the production of food grains in the country. In the Peninsular Hills and plateau region, about 46 million acres of land are uncultivated. In the northern plain regions also 18 million acres of land lie waste.

The Government of India proposes to bring 62 million acres of potential wheat-growing land under cultivation.

Provinces and States	In million acres.	Provinces and States.	In million acres.
Madhya Bharat	... 1.4	Bhopal ..	... .5
Uttar Pradesh	... 1.0	Vindhya Pradesh	... .5
Madhya Pradesh	.. .9	East Punjab States	.. .4
Bombay ..	.. .5		—
Orissa .	... .5	Total ..	6.2
East Punjab ..	.. .5		—

It is also necessary to pay more attention to subsidiary foods like bananas, tapioca and sweet potatoes. The Government of India has set up a *Subsidiary Food Production Committee* for the purpose. The Committee recommends increased production of sweet potatoes, tapioca and the utilization of groundnut cakes. The 3½ million tons of groundnut produced in India can yield 2 million tons of finest food equivalent in protein value to over 2,400 million gallons of milk. Tapioca as a staple diet is unsatisfactory because of a deficiency in the quantity and possibly the quality of its proteins. The present tendency in certain parts of India to foster consumption of tapioca at the expense of that of other foods, such as rice, is undesirable from the standpoint of nutrition.

The total acreage under tapioca is about 634,000 acres of which 582,000 acres are in Travancore-Cochin and the rest in Madras.

Tapioca's popularity appears to be based on its high yield, about three to five tons per acre which with careful cultivation can be raised to 15 tons per acre. It can thrive in relatively dry weather.

Attracted by this consideration, Bihar obtained cuttings of tapioca from South India with a view to popularizing its cultivation.

The Indian Council of Medical Research has started researches on all aspects of the problem of including tapioca in Indian diets. Analysis shows that tapioca contains only .07% protein against 6.4% in rice, 12.1% in whole wheat flour, 11.6% in bajra, 11.5% in barley and 11.1% in maize. Tapioca is also poor in carbohydrates and fats.

COMPARATIVE FIGURES

		Carbohydrates	Fats
Tapioca	...	38.7	0.2
Rice	..	79.1	0.4
Whole wheat flour (atta)	.	72.2	1.7
Bajra	..	67.1	5.0
Barley	. ...	69.3	1.3

Medical reports on tapioca must be discouraging to those who have fostered its growth as a subsidiary food.

Rice

The first mention of rice in India occurs in the Atharva Veda as early as 1,000 B.C. It is at present the most important crop in India, covering as it does nearly 30 per cent. of India's sown area. India is the second largest rice-producing country in the world.

Rice thrives best in high temperature and abundant moisture and the crop is generally grown in fields susceptible to being flooded at certain stages of its growth. Hence the greatest areas under rice are found in river deltas, in low-lying coastal districts and in tracts subject to floods during the monsoon. Rice can also be grown in hill-tracts if the supply of water is abundant, and the summer, warm. "For the purposes of cultivation, the hill-sides are cut into terraces which are levelled off and embanked by means of bunds in order to retain the moisture obtained from nearby streams or from rainfall."

In Madras, there are three rice crops in the year, known as the *Aus* (autumn), *Aman* (winter) and *Boro* (summer) according to the season in which they are harvested. The winter crop, most important of all, is sown between June and August, and harvested between November and January. The autumn crop is sown in

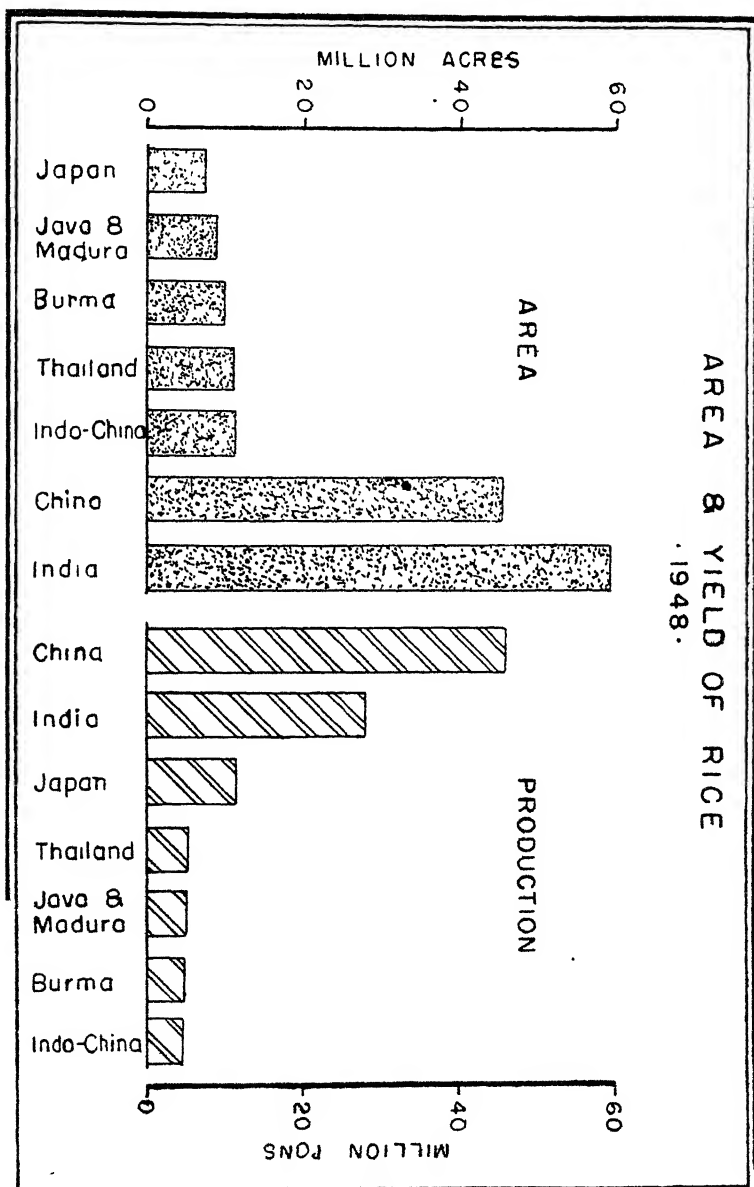


FIG. No. 17. Although India has the largest acreage under rice, her production falls below that of China.

March-July, and harvested in September-October. The summer crop is sown between November and January and harvested in March-May.

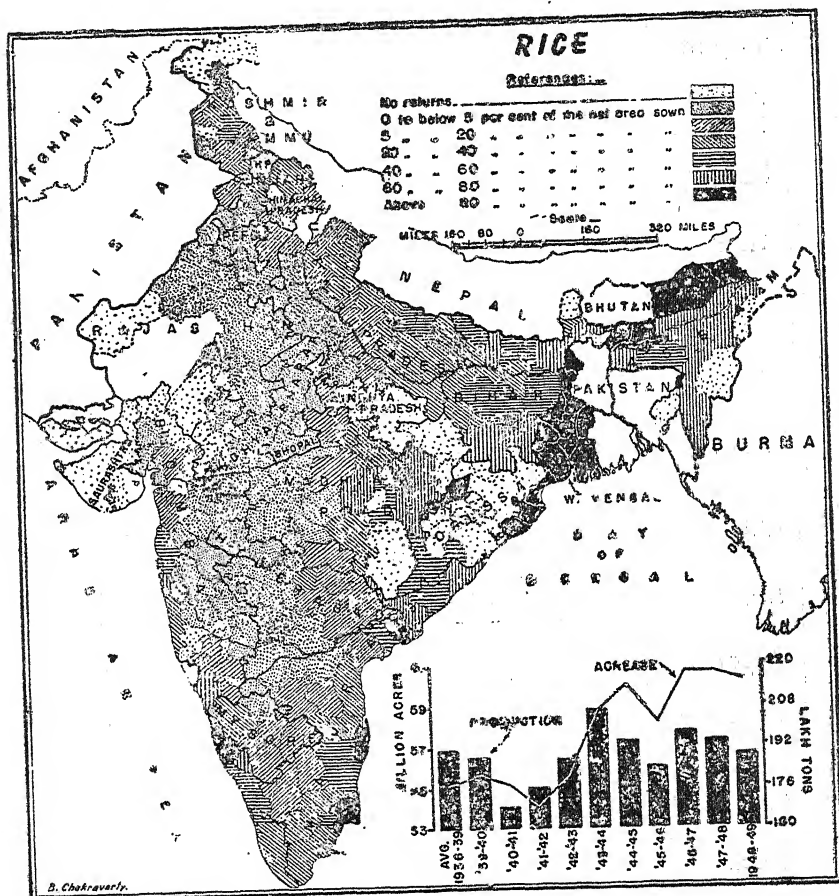


FIG. No. 18. Note that the rice-growing areas are practically confined to the eastern parts of the country.

In Madhya Pradesh and Madhya Bharat only one rice crop is cultivated. This is sown in May-June and harvested in September-November.

Rice is sown in India in three ways—by broadcast, by drill and by transplantation from a seed-bed. The first method is

practised where labour is scarce and the soil infertile. The second method is mostly confined to Peninsular India. The third method is common but it requires a plentiful supply of labour, because the seed-beds are to be highly manured before the seeds are sown. After four or five weeks, the seedlings are uprooted, tied into bundles and carried to the field where they are again planted by hand. The transplanting of the young plants from seed-beds to fields, cutting the rice with sickle and the husking of the grain—all involve much manual labour.

The monsoon greatly influences rice production in India. Its failure has much adverse effect on the output, because water is the principal factor in its cultivation.

TIME OF SOWING AND HARVESTING OF RICE IN DIFFERENT
AREAS OF INDIA

Province/ State	Winter Rice		Autumn Rice		Summer Rice	
	Sowing	Harvest- ing	Sowing	Harvest- ing	Sowing	Harvest- ing
Bengal	May- July	Oct- Jany.	March- July	June- Sept.	Oct.- Jany.	Feb.- April
Bihar	June- August	Nov- Dec.	May- July	August- Oct.	Sept.- Nov.	Feb.- March
Madras	June- Oct.	Dec.- March	—	—	Dec.- March	April- May
Punjab	March- August	Sept.- Nov.	—	—	—	—
U. P.	June- August	Sept.- Dec.	—	—	—	—
Coorg	June- July	Dec.- Feb.	—	—	—	—
Baroda	May- August	Dec.- Jany.	—	—	—	—
Kashmir	—	—	April- May	Sept.- Oct.	—	—
Mysore	June- July	Nov.- Dec.	—	—	Feb.	April- May
Bhopal	June- July	Nov.	June- July	Oct.	—	—
Cochin	Sept.- Oct.	Jany.- Feb.	April- May	Sept.- Oct.	Jany.- Feb.	April- May
Rampur	June- July	Oct.- Nov.	—	—	—	—
Hyderabad ..	June- July	Nov.- Dec.	—	—	Jany.- Nov.	April- May

The principal rice-growing areas of India are, in order of importance, Madras, Bihar, West Bengal, Uttar Pradesh, Madhya Pradesh, Orissa, Assam and Bombay.

AREA AND YIELD OF RICE IN INDIAN REPUBLIC (1950-51)

Regions	Area (in 000 acres)	Yield (in 000 tons)
West Bengal	9,796	3,910
Bihar	14,055	2,562
Madras	10,126	4,030
Madhya Pradesh	8,933	1,526
Orissa	9,489	2,718
Assam	3,712	1,294
U. P.	9,335	2,015
Bombay	3,000	1,004
Total	75,446	20,059

88 per cent. of the rice acreage in India is located in the provincial states and the remaining 12 per cent. in the Indian States.

The yield per acre of rice is influenced by a number of factors, such as rainfall, irrigation and soil, which are liable to vary from place to place. It also varies according to season. Summer rice generally gives the largest yield and autumn, the smallest. The average yield per acre is 862 lbs. and this figure does not compare very unfavourably with those of Indo-China and Thailand, but falls far short of the yields in the U.S.A., Japan, Egypt, and Italy where the yields per acre are 1,485 lbs., 2,454 lbs., 2,030 lbs. and 2,940 lbs. per acre respectively.*

Almost in every district of West Bengal rice accounts for more than 60 per cent. of the sown area. About 9.5 million acres of land are under rice cultivation in West Bengal with approximately 3.7 million tons of rice as annual yield. Other areas where rice crop covers over 80 per cent. of the sown area are Cuttack, Puri and Sambalpur in Orissa; Kamrup and Goalpara in Assam, and West Godavari, Chingleput, Tanjore and Kanara in Madras.

In spite of her production of 20 million tons, India is not self-sufficient in rice, and she has to import considerable quantities of paddy and rice. More than 200 million people of India eat rice

* *Rice Economy in Asia* (F.A.O. publication of the United Nations).

and so far India has been unable to produce all the rice needed. Normally, Burma sends $2\frac{1}{2}$ million tons to supplement India's production. In 1951, India imported about 748,500 tons of rice.

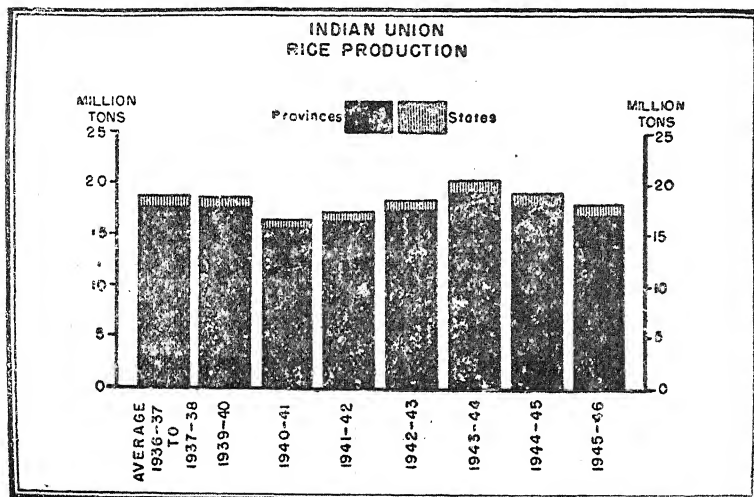


FIG. No. 19. Note the fall in production in 1940-41, and the peak production in 1944.

The bulk of imports is derived from Burma and the rest from China, Thailand, Egypt and Pakistan.*

West Bengal has a normal deficit of 300,000 tons. Madras, Bihar, Bombay and U.P. have larger deficit but in these provinces, wheat is the staple food crop. Assam, C.P. and Orissa normally have surplus production.

There is a large scope for further cultivation of rice in India, particularly in West Bengal, Bihar and Orissa. The three multi-purpose projects in the Damodar, Koshi and Mahanadi aim at making a million acres of land cultivated. Production of rice can also be increased in the Indian Union by 50 per cent. through intensive cultivation with improved varieties and better manuring.

A new method of rice cultivation has recently been developed in India which holds high promise towards solving India's food

* Of the 748,500 tons of rice in 1951, Burma supplied 304,186 tons, Thailand 216,172 tons, Egypt 4,624 tons, China 65,779 tons and Pakistan 15,778 tons.

shortage. The method is adopted from Japanese rice growing techniques.

It is estimated that if only $2\frac{1}{2}$ to 3 per cent. of India's present total irrigated paddy area is cultivated by this adopted Japanese method India need no longer import rice. India today is importing an average of 600,000 tons of rice yearly at an average cost of about Rs. 50 crores. This vast sum, if saved, could be used for other vital nation-building activities. The adopted Japanese method is basically a simple one. In Japan it produces yields averaging four times as great as the Indian average per acre. Its chief features are: (1) use of less and better seed; (2) sowing the seed in a raised "nursery" bed; (3) transplanting the seedlings in rows to make weeding and fertilizing easy; (4) use of natural and chemical fertilizers—compost, green manure, and ammonium sulphate.

Wheat

Wheat has been cultivated in India from time immemorial. Grains unearthed from the 3,000 year-old ruins of Mahenjodaro in the Indus Valley have been identified as *Triticuma Compactum*, a type of wheat cultivated in South-West Punjab.

Wheat is the staple food of the people in East Punjab and Uttar Pradesh. India occupies the third place in the list of wheat-producing countries and produces about one-eighth of the world's total.

Wheat requires a large amount of heat for its grain to ripen; but the necessary period of heat need not be very long as the grains ripen quickly. At the sowing season, wheat requires water but too heavy rain like that of West Bengal, Assam and Eastern Madras is unfavourable to its cultivation. The plant can endure extreme dryness provided there is provision for minimum of water by rainfall or by means of irrigation. In East Punjab and the Uttar Pradesh, where the rainfall is very small and never exceeds thirty inches per annum, wheat cultivation has become very successful with the help of irrigation.

In India there are two principal varieties of wheat: the *normal bread wheat* and the *macaroni wheat*. The first type grows as an

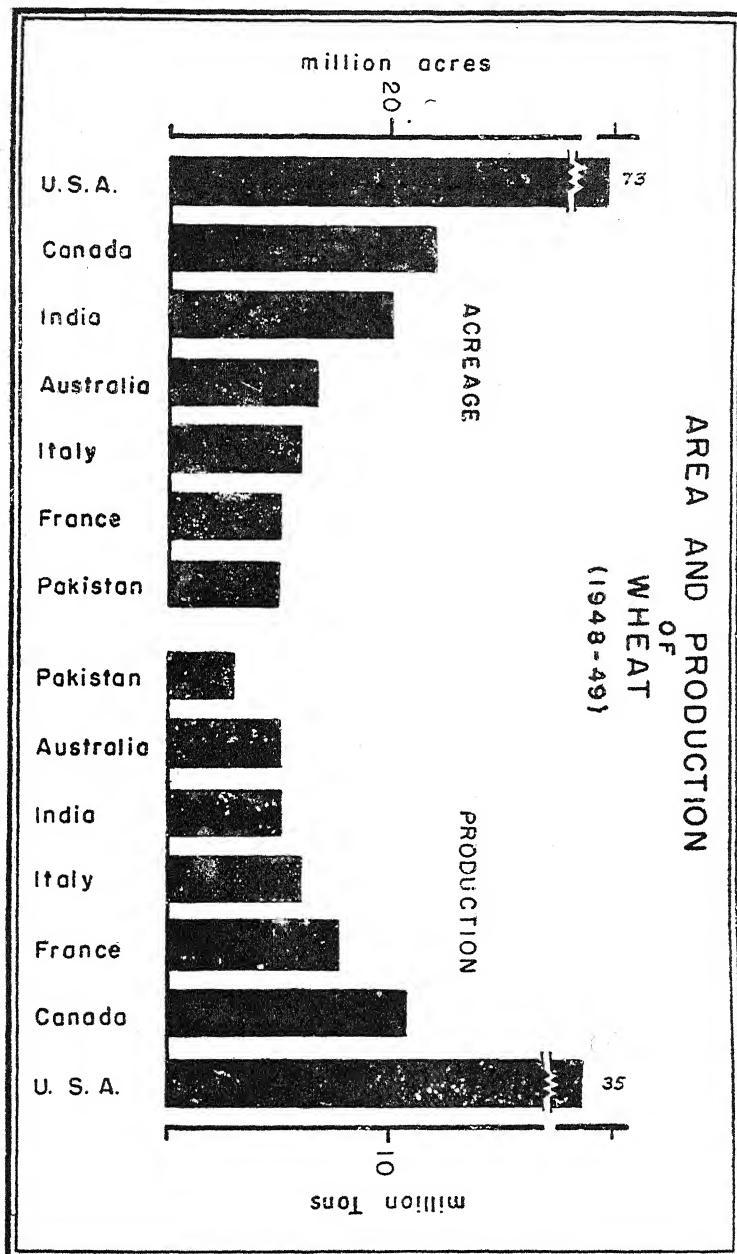


FIG. No. 20.

irrigated crop in East Punjab and U.P., while the second type is grown as a rain-fed crop on the clayey black soil of Bombay, M.P. and Hyderabad.

In East Punjab and Western U.P., the bulk of the crop is generally sown by the end of November. In the Uttar Pradesh and Bihar it is generally grown in late October or early November, while in the Deccan and parts of the Bombay Presidency the crop is sown between September and the middle of October.

Generally wheat takes 3 to 6 months to ripen. In the south the growing period is shorter than in the north. The harvesting may begin at the end of December in the south, while in Madhya Pradesh, Madhya Bharat and Vindhya Pradesh, it commences normally in March. In western U.P., Delhi and Eastern Punjab, harvesting is normally in full swing by the end of April.

TIME OF SOWING AND HARVESTING OF WHEAT IN DIFFERENT AREAS
IN THE INDIAN UNION

Province/State		Sowing	Harvesting
Ajmere-Merwara	...	Nov.-Dec.	March-April
Bihar	... ..	Oct.-Nov.	March-April
Bombay	... ..	Oct.-Nov.	March
C.P. & Berar	... ..	Oct.-Nov.	Feb.-March
East Punjab	... ..	Oct.-Dec.	March-May
U.P.	... ..	October	March-April
West Bengal	... ..	Nov.-Dec.	Feb.-April
Baroda	... ..	Oct.-Dec.	March-May
Bhopal	... ..	Oct.-Nov.	March
Hyderabad	... ..	Sept.-Oct.	Feb.-March
Kashmir	... ..	Oct.-Nov.	April-May
Mysore	... ..	October	February
Rampur	... ..	Oct.-Nov.	March-April

WHEAT-PRODUCING AREAS IN INDIAN REPUBLIC (1952-53)

State	Area (acres)	Yield (tons) (In thousands)
Bihar	1,210	285
Bombay	1,731	252
Madhya Pradesh . .	2,739	558
Punjab	2,984	1,071
Uttar Pradesh ...	8,235	2,800
West Bengal ...	108	37
Hyderabad . .	506	45
Madhya Bharat	1,649	251
P.E.P.S.U. . . .	898	315
Rajasthan	1,284	339
Saurashtra .. .	194	63
Bhopal	454	81
Himachal Pradesh ..	219	36
Vindhya Pradesh ...	686	152
Total . .		23,082
		6,388

In 1950-51, the acreage under wheat was about 24 million acres with 6.6 million tons of yield.

Ploughing and sowing, harvesting and threshing call for a large amount of manual labour and therefore it is cultivated on a large scale in those areas where a large force of labour is available.

India grows less than one acre of wheat for every ten persons. Canada and Australia, on the other hand, have two and a half acres for each member of population. Continental countries, *e.g.*, France and Italy, have one acre of wheat for every three persons, and the United Kingdom has one for four.

Compared to other countries, India's figure is indeed unsatisfactory. The average yield of wheat per acre in India is

636 lbs. The following table shows the average yield of wheat in certain States.

AVERAGE YIELD OF WHEAT

(lbs. per acre)			
Uttar Pradesh ...	...	786	Hyderabad ... 231
Madhya Pradesh ...	...	444	Gwalior ... 458
Bihar ...	...	882	Madhya Bharat ... 382
Bombay ...	...	447	

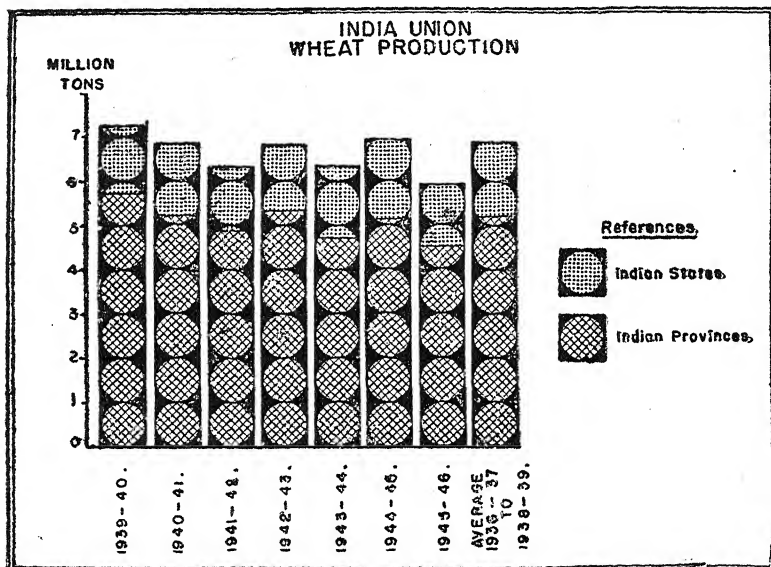


FIG. No. 21. Note the gradual fall in production from 1940 to 1942. The peak production was in 1939-40.

The difference in yield per acre is due to the condition of water supply. The areas which are served by irrigation produce the higher yield while the area which depends only on rainfall has a lower yield.

In U.P., wheat is cultivated more or less throughout the province and the rich producing districts are Dehra-Dun, Shaharanpur, Muzaffarnagar, Meerut, Moradabad, Etawah, Shajahanpur, Budaun and Nainital, where more than 30 per cent.

of the area is under wheat. The basin of the Narmada in Madhya Pradesh is also a rich wheat region. Although the monsoon discourages the wheat cultivation in West Bengal, about 98,000 acres are under wheat in Murshidabad and parts of Nadia.

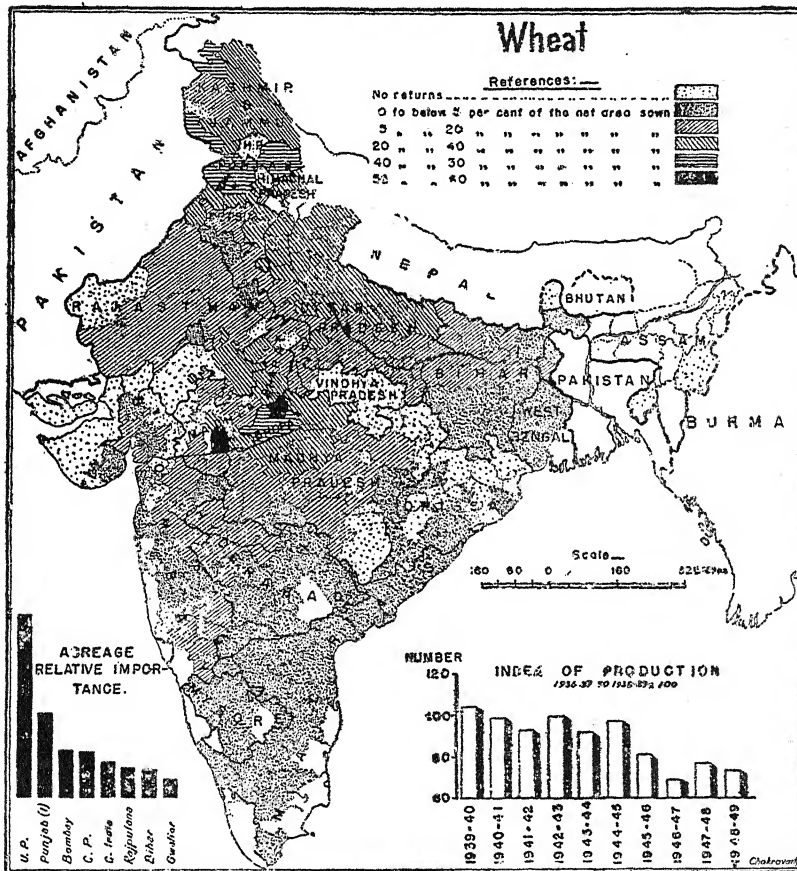


FIG. No. 22.

Nearly 45 per cent. of Indian wheat is consumed in the villages of production and the remaining 55 per cent. is put on the open market.

In India the average yield of wheat per acre is abnormally low. Other producing countries use farm machinery, grain elevators,

better seeds etc., which help to increase enormously their outturn per acre. Indian cultivators are poor, conservative and illiterate and, therefore, cannot improve their methods of cultivation.

In 1952-53, the actual value of imports of wheat and wheat flour into India was Rs. 84 crores. According to the International Wheat Agreement, India secured an acceptance of her guaranteed purchase of 1 million tons per year for four years.

Till 1920 India used to export considerable quantities of wheat. The enormous increases of wheat production since 1920 in Canada, Argentina and Australia as well as the extension of cultivation in many European countries by protective measures, such as heavy import duties and the quota system, have resulted in considerable decline of demand on Indian wheat. Till 1914 the export of wheat from India was 14 per cent. of the total output, but in 1938-39 the percentage was only 2.8. Since 1942 there has been practically no export of wheat from India, firstly because of war up to 1945, and secondly because of partition of the country in 1947 which has made the West Punjab wheat unavailable to the Union.

The scope for further production of wheat is indeed great in East Punjab and U. P. but then in future exports may not increase, because the increasing population will require more wheat.

Millets

Millet is a short season crop and is grown generally in Madras, Bombay and the adjoining districts of Hyderabad. It flourishes best in hot lands which are fairly dry. It can be grown without irrigation even in areas where rainfall is scanty.

There are two varieties of millets in India—Jowar and Bajra.

Jowar is extensively cultivated in the Deccan, and also to some extent in other dry parts of India. The area under cultivation in 1950 was 36 million acres and the yield was 5 million tons. Bombay, Madras, M. P. and Hyderabad account for more than 50 per cent. of the total acreage under jowar in India. Other areas are East Punjab, Gwalior, Central Rajasthan and Madhya Bharat. In the Sholapur district of Bombay more than 60 per cent. of the sown area is under jowar. In Poona and Belgaum districts the acreage under jowar accounts for more

than 50 per cent. of the total area. Jowar is commonly called *Sorghum* in Europe and America. In India, the product is of great importance both as food and as fodder.

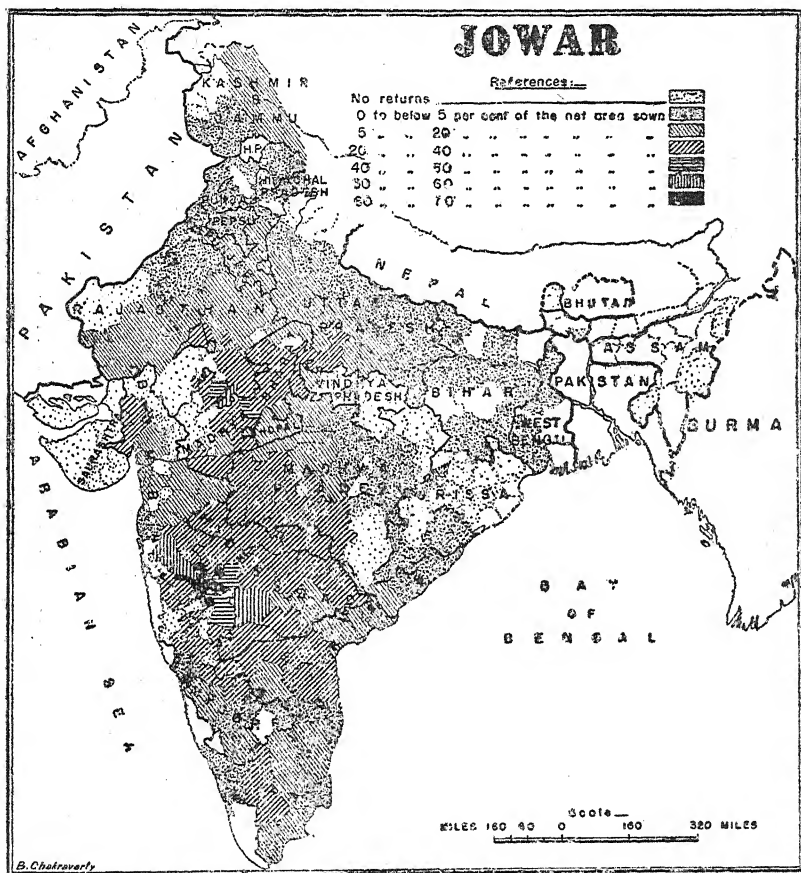


FIG. No. 23.

Bajra is a short season crop and is grown generally in poorer soils. It is less widely cultivated and is essentially a village food crop. Bombay, Madras, East Punjab, Hyderabad and Rajasthan are the principal producers. The area under cultivation was 22 million acres in 1951 and the yield in the same year amounted to 2.5 million tons. More than two-thirds of the acreage under

bajra is confined to Bombay, Madras, U. P. and East Punjab. In Bhavnagar (in Kathiawar) bajra covers more than 60 per cent. of the sown area.

One-fourth of the total production of millets is exported and the destinations are Sudan, Arabia, Holland, Germany, Italian East Africa and Aden. More than 90 per cent. of the millet is shipped from Bombay.

Barley

Barley resembles wheat in general appearance and manner of growth. This can thrive on scanty moisture supply. If, in any year, rainfall is below normal for wheat cultivation, barley is substituted. Light and sandy soils are the best for barley. It can be cultivated even in alkaline soils. It is a winter crop in India and is sown in October and November. The harvesting season begins in March from the third week of March and is completed by the middle of April. Barley has a very short period of growth compared to wheat or grain. "Whenever due to an unfavourable reason it is too late to sow gram or wheat, the farmer generally puts down barley as a catch crop."

India raises nearly 5 per cent. of the world's total barley. It is mainly grown in Northern India and the U. P. has the largest acreage. The Republic has an area of about 7 million acres under barley with average annual production of about 2 million tons. In U. P. the crop is relatively important, having about 9 per cent. of the total cropped area under it. Its cultivation is very extensive in the Ganges basin of the U. P., particularly in the districts of Banaras, Jaunpur, Gazipur, Gorakhpur, Allahabad, Ballia, Pratapgarh, Azamgarh and in Garhwal. Its cultivation also covers a large percentage of the total sown area in Saran, Champaran and Muzaffarpur in Bihar. In Bihar, the area under barley works to about 5 per cent. of the total cropped area. Thus the two chief zones of barley production are (a) north-western districts of Bihar and the adjoining north-eastern districts of U. P. and (b) the south-eastern districts of East Punjab and the adjacent districts of U. P. The internal demand for barley is so high that exportable surplus cannot attain considerable dimensions. Consequently, India's share in the international trade of barley as an exporting country has been very small, amounting to a half per cent. of the total world exports in recent years.

Maize

Maize is found more or less all over India, but Northern India raises the major portion. Maize requires high temperature and much more summer rain than wheat. The soil should be rich and well drained. Most of the maize is grown in regions with an annual rainfall of at least 20 inches. The total area under maize is about 6.5 million acres with an average annual production of 2 million tons.*

State	(In thousands)	
	Area (acres)	Production (tons)
	1950-51 Final estimate	1950-51 Final estimate
Assam . .	45	10
Bihar . .	1,440	314
Bombay	434	52
Madhya Pradesh .	284	59
Madras . .	44	19
Orissa . .	59	11
Punjab . .	738	161
Uttar Pradesh .	2,047	641
West Bengal ..	94	24
Hyderabad .	337	27
Jammu and Kashmir .	261	109
Madhya Bharat	505	40
PEPSU	167	49
Rajasthan	644	75
Ajmer . .	77	12
Bhopal ..	16	2
Bilaspur	45	7
Himachal Pradesh .	240	60
Vindhya Pradesh ..	82	.
Total for India .	7,563	1,682

The U. P., Bihar and East Punjab are the leading producers. Maize cultivation is practised throughout U. P. and Bihar, although the Upper Ganges valley has a large acreage. North-

* The estimated area for 1949-50 was 7.8 million acres and production 1.9 million tons. (*Agricultural situation in India*, Vol V, No. 3, 1950, p. 204).

Eastern Punjab and South-Western Kashmir are also rich producing areas.

The crop is raised mainly for consumption in the areas of production, and exports are never considerable. India exports an insignificant quantity of maize, a little more than 200 tons. Exports are mainly from Bombay and Calcutta. Bombay alone sends more than 50 per cent.

In recent years certain industrial firms of the Indian Republic have developed the production of starch and glucose from maize.

Pulses

Pulses include food grains like gram, arhar, lentils or masur, etc. These grains are raised in different parts of India and consumed mostly in the areas of production. These grains are important both from the point of view of husbandry and of nutrition. Their nutrition value is great as a source of protein. More than fifty million acres of land accounts for the cultivation of pulses in India. Pulses constitute an important food-stuff not only for villages but for animals as well. They are also grown as rotation crops to restore the fertility of the soil. In 1950-51, the acreage under pulses covered 26.4 million and production was 3.9 million tons.

Gram is the most important pulse and is grown extensively in the Uttar Pradesh. Other producing areas are Bihar, East Punjab and Madhya Pradesh, Bombay, Hyderabad and Mysore. The average annual output is nearly 4 million tons and the acreage exceeds 15 million. In 1952, the estimated acreage was 17 million acres with 3.2 million tons of production. Gram is often cultivated in combination with wheat.

The percentage of acreage is greater in Southern Uttar Pradesh (between Agra and Mirzapur), North-East Punjab, Central Bihar, South Mysore and in North-East M. P. Local consumption being great, exports of gram are never considerable.

Lentil or Masur is grown particularly in the Central Provinces, Madras and the Uttar Pradesh, though in other provinces its cultivation is not uncommon. "*Arhar* is one of the most important food-stuffs of the country-side and is generally grown as a mixed crop, particularly in rotation with cereals." The annual production of these two pulses is very considerable. The

exports of pulses are made to U. K., Ceylon, Mauritius, Burma and France. Calcutta, Madras and Bombay participate in the trade.

Tea

India is the largest tea-producing country in the world. The region of Indian tea-cultivation is a wide one. Beginning with the Himalayan plantations in the Punjab near 33°N. latitude, it extends to the Peninsular India between 10° and 13°N. latitude. The principal belt of tea-plantations lies between 23° and 32°N. latitude.

Tea-plant requires a deep fertile soil, which must be exceptionally well-drained, so that there may not be stagnant water on it. It is, therefore, generally grown on hill-sides. High temperature is essential for tea-cultivation.

Seventy five per cent. of Indian tea is obtained from Assam and West Bengal. In recent years, Southern India has become an important tea-producer and she contributes nearly 20 per cent. of the Indian output.

AREA UNDER TEA IN THE DIFFERENT STATES OF
INDIAN UNION 1949

States	Area (in 000 acres)	States	Area (in 000 acres)
Assam ...	.. 366	Mysore ...	... 5
West Bengal ...	.. 169	Travancore ...	... 77
Bihar ...	... 4	Tripura State ...	... 11
Madras ...	.. 78	Cochin ...	... 2
East Punjab ...	.. 10		
U. P. ...	... 6	Total ...	725

The yield in the same year was 586 million lbs. in the Union. The production in 1950-51 was about 600 million lbs.

Assam is the largest producer and contributes more than 50 per cent. of the total Indian tea production. In the districts of Darrang, Sibsagar, Lakhimpur (in the Upper Brahmaputra valley) and in Cachar tea-plantations cover more than 30 per cent. of the sown area. The Sadia Frontier Tract also grows a large amount. These areas are served magnificently by railways and rivers.

Although West Bengal occupies the second position in the list of tea-producing provinces, her tea-cultivation is not so extensive as that of Assam. The two adjoining districts of Darjeeling and Jalpaiguri produce almost the entire output of West Bengal. West Bengal production varies between 20 to 25 per cent. of the Union's total. The Tripura State raises a small quantity. Tea is also grown in Purnea, Ranchi and Hazaribagh in Bihar; Garhwal and Almora in the U. P.; and Kangra in East Punjab.* In Southern India, the major portion of the output is raised by Travancore and Madras; the other areas are Coorg, Mysore and Satara (Bombay).

India is the greatest tea-exporting country in the world, supplying as she does about 50 per cent. of the world's trade in tea.

SHARE OF INDIA IN WORLD'S EXPORT OF TEA

		(000 tons)			
		1937	1949	1937	1949
India	151.4	161.9	Japan & Formosa	24.5	4.0
Ceylon	.. 97.6	136.2	Indo-China	.. 2.0	1.4
Indonesia	66.7	9.3			
China	. 51.1	17.5	Total	395.3	330.6

India exports usually 76 per cent of the total tea produced in the country. The chief recipients of Indian tea are the U. K., Iran, Canada, the U. S. A., Australia and Irish Republic.

EXPORT OF TEA

	1950-51	1951-52	1952-53
U. K.	286,974	287,824	281,283
Egypt ...	3,544	3,563	13,169
U. S. A. .	37,598	26,604	29,571
Irish Republic ..	28,043	24,104	12,441
Canada .	20,978	19,157	22,584
Australia ..	16,941	6,448	12,630
Iran ...	11,430	10,938	1,118
U. S. S. R. ...	—	5,123	—
Kuwait ..	5,011	8,095	8,950
Total ...	439,225	425,518	423,664

* Bihar, Uttar Pradesh and East Punjab account for 5 per cent. of the total area under Tea.

In these foreign markets, Indian tea has to compete with the tea of Ceylon, China and Java. During World War II, India and Ceylon were the only suppliers of tea to the world market, because

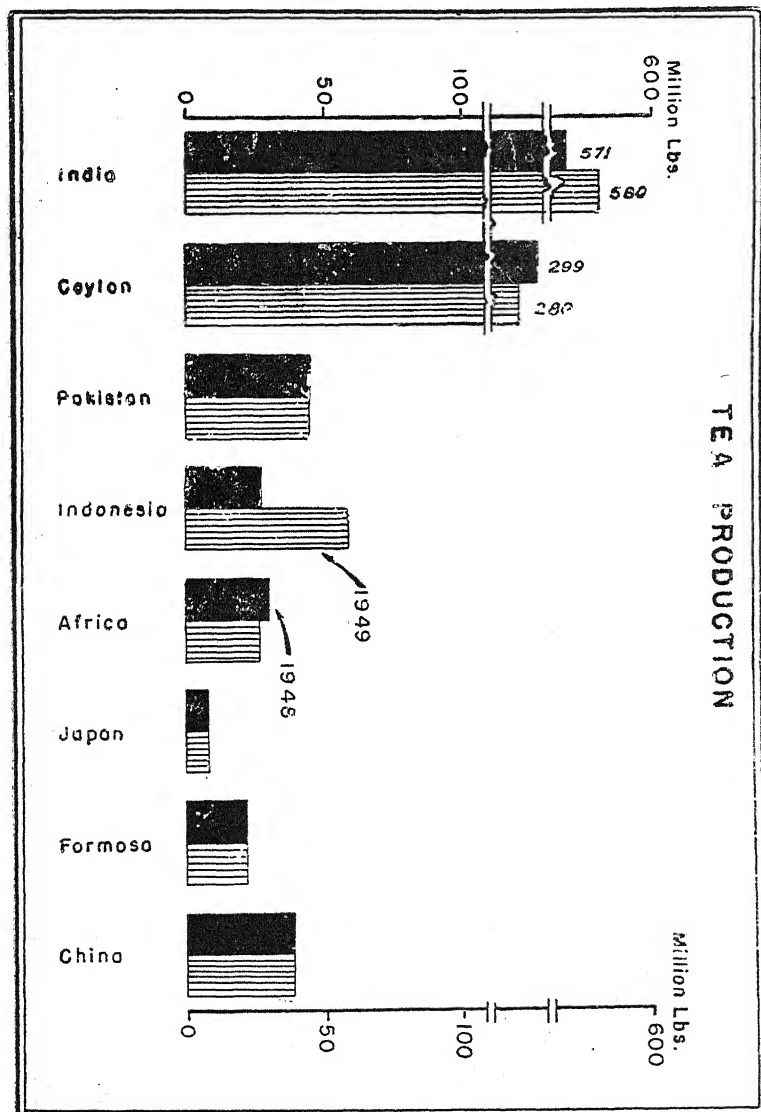


FIG. No. 24.

Java, Japan, China and Sumatra were in the war zone and their tea production was very much disturbed. Until the production position of these countries improves, Indian tea will have great demand in the world market. There are fair prospects of a better market for Indian tea in New Zealand. If shipping facilities at Calcutta and Cochin are improved, it may be possible to sell about 5 million lbs. of Indian tea in New Zealand a year against 1 million lbs. as at present.

The share of Calcutta in the total export of tea is usually 83 per cent. and the remainder is shipped from Madras, Cochin and Bombay.

SHARE OF PORTS IN TEA TRADE

		(in 000 lbs)			
		Calcutta	Madras	Cochin	Bombay
1949-50	...	378,593	59,779	—	—
1950-51	...	374,722	61,135	—	—
1951-52	..	354,273	3,932	61,706	5,626
1952-53	...	346,697	3,258	65,043	8,743

The export of Indian tea was regulated for long according to the terms of the *International Tea Agreement*. Between 1927 and 1932, there was a great over-production of tea in the different producing countries, as a result of which prices fell below the cost of production. On 1st April, 1933, an agreement was reached by India, Ceylon and Java which contained the following points: "(a) That the exports of tea from the producing countries be regulated in order to restore equilibrium between supply and demand; (b) That the governments of the respective countries will undertake to prohibit exports in excess of the quotas agreed upon; (c) That the agreement shall be for a period of five years; (d) That the existing tea area must not be extended during the said period of five years except in special cases where the existence of an estate would otherwise be imperilled."

According to the Agreement, India's standard quota was 380 million lbs. In 1938, the agreement was renewed for another five years. During the war years of 1939-45, India's export quota was increased to meet the world shortage of tea. A Board was formed in India to look after the interests of the Indian tea industry. Its name is *Central Tea Board*. By means of propaganda, the Board is popularising Indian tea in villages and towns. Apart

The new International Tea Agreement was signed by India on 1st April, 1948, for the regulation of export and production. The agreement was extended till 1955. In 1952, however, India discontinued its membership of the International Tea Market Expansion Board.

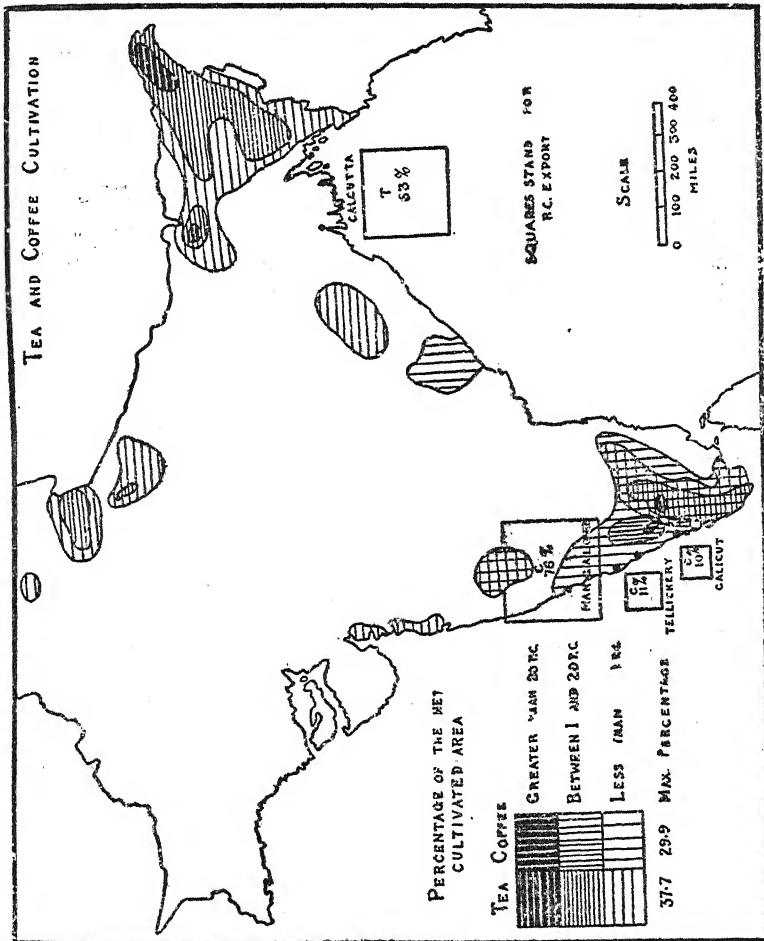


FIG. No. 25. Note the extensive tea belt from North East Assam to North East Bihar. More than 50 p.c. of Indian coffee is obtained from Mysore.

In 1950-51, India exported 430 million lbs. of tea worth Rs. 78 crores. The U.K., by far the largest buyer of Indian tea, purchased 278 million lbs. of tea.

After the U.K. the next largest buyer was the U.S.A., which purchased 37.5 million lbs., the Irish Republic followed next with 28 million lbs., and Canada and Australia took 21 million lbs. and 16 million lbs. respectively. Other buyers were: Iran (11 million lbs.), Arabia (7 million lbs.), Netherlands (4 million lbs.) and Turkey (4 million lbs.).

Coffee

The systematic cultivation of coffee in India was started from 1830 when a large plantation was opened in Mysore. Southern India has the monopoly of coffee cultivation in India.

The coffee plant requires a rich well-drained soil, a warm climate and a moderate supply of moisture. An annual rainfall of between 60 and 100 inches is usually considered the most suitable. The optimum temperature is between 59° and 77°F. Shade is required to protect the plants from too direct light and heat. Shade improves the growth conditions and prolongs the vitality of the plant. Three to five years are required for the plant to mature after which it bears fruits for some thirty years. The plantations are generally located between levels 2,000 and 4,000 feet on hilly forest land. These areas are exposed to the summer monsoon. The optimum altitude and rainfall vary between districts: in North Mysore the best yields are obtained from estates at an altitude of about 4,000 feet with an annual rainfall of 50 inches, in North Coorg, at 3,500 feet with a rainfall of 80 inches.

In India, the plant is sown in the rainy season and the berries begin to ripen in October. Plucking and hand-picking of berries continue till January. There are two varieties of coffee—*Arabica* and *Robusta* of which the former accounts for 75 p.c. of the coffee production in India.

Nearly 2,00,000 acres of land are under coffee plantations and the average yield exceeds 3.5 million lbs. In 1950, coffee production in India was 20,360 tons. The annual consumption of coffee in the country is about 17,000 tons.

*COFFEE: ACREAGE, PRODUCTION AND AVERAGE YIELDS

Areas	1935-39 Acreage	Production 1935-39 (1000 lbs.)	Average yield per acre in lbs.
Madras	43,711	9,136	205.2
Mysore	101,003	16,127	160.6
Coorg	39,949	9,586	249.9
Travancore	998	141	142.7
Cochin	1,962	386	196.3
Total for India ...	186,682	35,376	187.3

Seventy p.c. of Coffee acreage is Indian-owned and 30 p.c. European-owned.

Southern India has nearly 7,000 coffee plantations which engaged 65,000 permanent labourers and 35,000 temporary labourers. Mysore alone possesses 4,600 plantations. In Mysore, the plantations are mostly confined to the south and west, particularly in the districts of Kadur, Shimoga, Hasan and Mysore. Mysore has the largest acreage under coffee plantation and the production is always over 50 per cent. of India's total. In Madras, coffee plantations are found mostly in the south-west—from North Arcot to Tinnevelly including the western areas. The Nilgiri is the most productive area of Madras. Some plantations are also found in Vizagapatam in the north-east. Madras contributes nearly 23 per cent. of the Indian output. In Coorg, more than 20 per cent. of the total acreage is under coffee and the region supplies more than 1 per cent. A little coffee is also grown in the Satara district of Bombay.

Fifty per cent. of the annual production of coffee is consumed in India. The Indian coffee industry is therefore very much dependent upon foreign markets.

Indian coffee is exported to U.K., France, Germany, Holland, Belgium, Australia and Iraq. Participating ports in the export trade are Mangalore, Tellicherry, Calicut and Madras (Mangalore 76 p.c., Tellicherry 11 p.c., Calicut 10 p.c., Madras 3 p.c.). The exports of Indian coffee have fallen off considerably as a result of the competition of Brazilian coffee which to-day dominates the

* *The World's Coffee, 1947*, F.A.O. Rome, page 250.

coffee market of the world. It is interesting to note that Western Germany is today the leading buyer of Indian Coffee.

EXPORT OF COFFEE

		(In cwt.) 1949-50	1950-51	1952-53
U. K.	..	16,288	11,831	6,001
Holland	...	3,757	6,251	2,204
France	...	29	9,898	2,088
Italy	...	7,137	2,217	3,091
Iraq	...	900	3,054	—
Western Germany	..	—	2,500	18,282
Total		66,628	53,533	43,812

The Indian Coffee Board is now engaged in finding out markets for Indian Coffee, both in India and abroad. The Indian Coffee Board which is constituted under the provisions of the Coffee Market Expansion Act, 1942, controls the marketing and export of coffee. All coffee grown in the country is required to be delivered into a pool maintained by the Coffee Board. Coffee is released for the internal market through public auctions and co-operative societies and exports are allowed only under Licences issued by the Board. Propaganda in the U.K. and other parts of Europe is met by the levy of a customs duty at the rate of a rupee per cwt. on coffee exports and an excise duty at the same rate levied on coffee released for consumption in India. Propaganda measures for increasing consumption were initiated in 1936. In India, coffee houses have been opened in several towns like Calcutta, Bombay, New Delhi and Secunderabad.

Tobacco

The Tobacco plant was first introduced into India by the Portuguese in 1508. It has a wide climatic range and is cultivated in India throughout the country. The harvesting period is between February and April.

India is the second largest tobacco-producing country in the world and contributes about 35 per cent. of the world's total.

India, together with U.S.A. and China, accounts for 60 per cent. of the world's tobacco-growing areas, which is of the order of 7·2 million acres. Nearly 1 million acres of land are under tobacco cultivation and the average production is about 4,00,000 tons a year. In 1952, the area under tobacco in India was 7,68,000 acres and production 211,000 tons.

Tobacco cultivation is geographically confined to two main zones—the Eastern Zone, comprising Bihar, U.P. and West Bengal and the Southern Zone which comprises Madras, Mysore and Bombay.

In 1950, the Eastern Zone had under tobacco about 100,000 acres and the production was about 68,000 tons. Bihar had 35,000 acres with 42,000 tons in the same year. The districts of Muzaffarpur, Darbhanga, Monghyr and Purnea produce 90 per cent. of Bihar tobacco. In West Bengal, tobacco tracts include Jalpaiguri and Cooch Bihar; some quantities are also raised in Hooghly. West Bengal raises only cigar tobacco and hookka tobacco.

About 50 per cent. of the production of raw tobacco in the country comes from Madras where the important tobacco-growing districts are Guntur, Vizagapatam, East Godavari, Coimbatore and Madura. Two-thirds of the total acreage of Madras are confined to Guntur. Madras is noted for cigarette virginia, cigar tobacco, cheroot tobacco, chewing tobacco and snuff.

In Bombay, the tobacco-growing regions are Belgaum, Satara, Baroda and Kaira. Tobacco production of Bombay is about one-third of Madras.

Outside these two zones, tobacco is cultivated in the East Punjab, particularly in the districts of Jullandhar, Hosiarpur and Gurdaspur, and also in the Bidar district of Hyderabad.

The leaf produced in India is generally of coarse, heavy type, with a dark colour and a strong flavour and, as such, it is unsuitable for cigarette-making. Indian leaf makes an excellent filler. The loose cotton soil combined with the moist climate of Guntur, Kistna, East and West Godavari districts produce the best type of virginia. These districts alone yield 95 per cent. of India's cigarette tobacco. Guntur is the chief market. The production of tobacco similar in colour, flavour and texture to the recognised virginia tobacco is being raised in Madras and Bihar.

The bulk of the tobacco grown in India is consumed in the local areas, and the exportable surplus is never considerable. India exports unmanufactured tobacco to U. K., U. S. S. R., Netherlands, Aden, Hongkóng, Sweden, Ceylon and Kenya. U. K. is the largest buyer although the quantity is on the decrease.

EXPORTS OF RAW TOBACCO

		<i>(in 000 lbs.)</i>		
		1950-51	1951-52	1952-53
U. K.	.	38,790	42,146	32,325
Hongkong	...	1,260	18,217	2,322
U. S. S. R.	..	4,408	7,582	3,639
Holland	...	6,186	2,328	2,573
Aden	..	4,248	4,618	3,069
Pakistan	.	7,554	2,261	1,058
Total ...		93,031	99,235	75,139

About $\frac{5}{8}$ ths of the exports are handled by Madras, the share of Bombay being 10 million lbs. and of Calcutta, hardly 1 million lbs. The U. K. has always been the chief market for Indian tobacco.

The Government of India have set up a Tobacco Committee which pays attention to the improvement of flavour and aroma of the Indian tobacco and also to the problems of production, processing and marketing. If proper attempts are made, Indian Union can curtail the imports of finer grades of cigarettes as well as create markets in the Middle East, Europe and Pakistan for tobacco.

There is a great future for tobacco industry in India. India's annual consumption of cigarettes is estimated at several millions. About 90 per cent. of the huge consumption of cigarettes is produced by foreign interests, while 3 per cent. represents direct import and only the remaining 7 per cent. is indigenous production.

Sugar-cane

India is not only the original home of the sugar-cane but she is also the largest producer in the world. India has approximately 37 per cent. of the world's sugar-cane area. Although

sugar-cane is cultivated throughout India, the most important sugar-cane tracts are in the U.P., Bihar, West Bengal, East Punjab and Bombay. In fact, Northern India has a preponderant interest in the crop. From the point of view of climate and soil, the Peninsular India is ideal for sugar-cane cultivation. The average yield of sugar-cane in the South is about four times as high as that in the north. There is an additional advantage in the fact that the crushing period of sugar-cane in the south is almost twice as long as that of upcountry plantation. Thus geographically, the Uttar Pradesh and Bihar are not as suitable as Bombay, Madras and Mysore are in the matter of sugar-cane cultivation.

ESTIMATES OF AREA AND YIELD OF SUGAR-CANE IN 1952-53

Regions	Area (000 acres)	Yield of raw sugar (000 tons)
Uttar Pradesh	2,639	2,646
Bihar	361	246
East Punjab	.. 371	414
West Bengal	... 52	104
Madras	.. 263	700
Bombay	186	461
Orissa	60	112
Assam	66	73
Hyderabad	90	175
Total	4,376	5,260

In 1951-52, the total production of sugar was 1,450,000 tons which left a surplus of about 400,000 tons of sugar after meeting the internal demand. Thus the sugar position in India has very much improved. About 25 per cent of the actual sugar-cane crop is consumed by factories for sugar production, and the rest goes to the making of gur.

The Uttar Pradesh produces more than 50 per cent. of India's total output. The plant is cultivated throughout the province and the higher acreage is devoted to it in Shaharanpur, Shajahanpur, Fyzabad, Gorakhpur, Azamgarh, Ballia, Jaunpur, Banaras and Bulandshahr. In Bihar, the important districts are Champaran, Saran, Darbhanga and Muzaffarpur.

East Punjab, which is the third largest sugar-cane producing province in India with a produce less than one-tenth that of the U.P., cultivates the plant extensively in Amritsar, Jullandhar and Rohtak.

West Bengal also produces a large quantity of sugar-cane, but the quality is poor. The producing districts are Birbhum, Burdwan and Nadia. About 67,000 acres of land are under sugar-cane in West Bengal.

India's sugar production per acre is the lowest in the world, being 1.50 to three tons ranging from cane to cane. It has been established that "in actual sugar, India's production per acre is

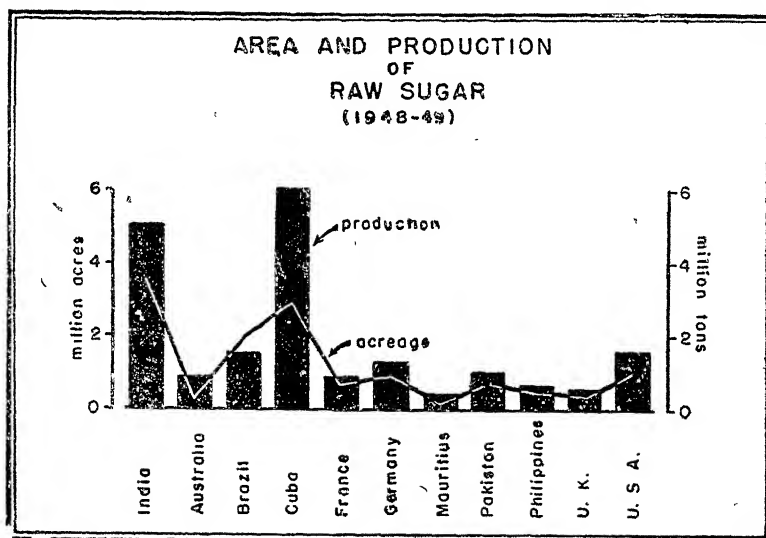


FIG. No. 26. Note the greater production with lesser acreage in 1948-49 than that in 1939-40.

less than one-third that of Cuba, one-sixth that of Java, and one-seventh that of Hawaii". Lack of fertilizers, poor varieties of cane, small and scattered nature of the holdings and backward methods of cultivation retard progress towards increased yields.

(a) Sugar-cane is planted in India in February and the harvest begins in November. Thus sugar-cane remains in the ground for 9 months compared with 14 months in Java. Consequently the sugar content in a cane in India is comparatively low.

(b) As the bulk of sugar-cane area is in Northern India where we find extremes of temperature in summer and winter, the growing period is also short.

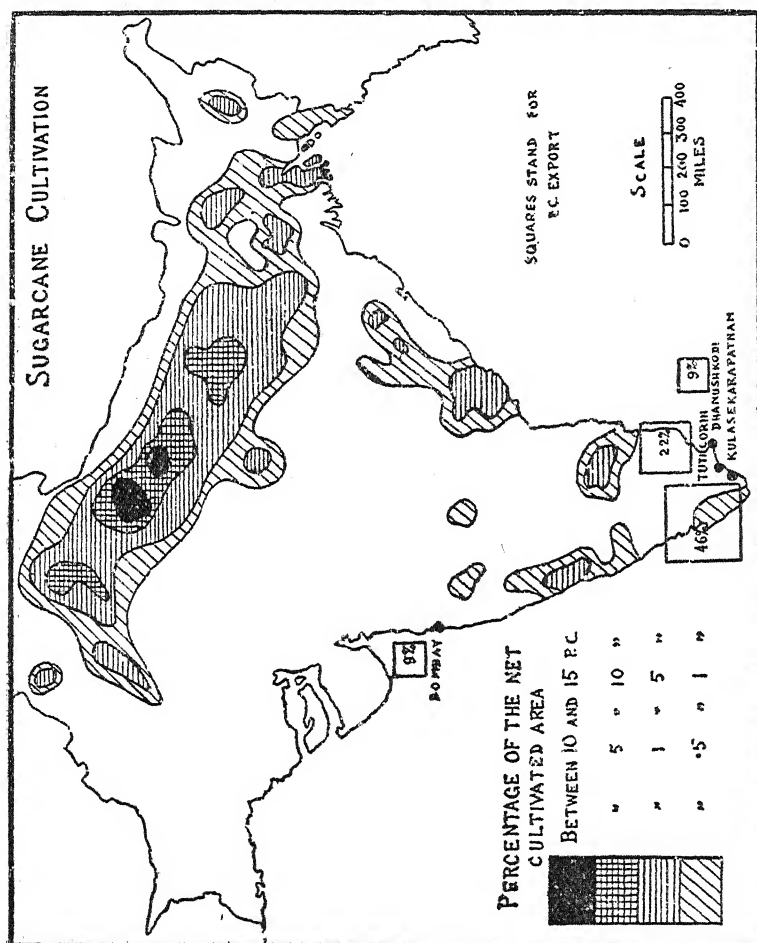


FIG. No. 27. Note the great concentration of sugar-cane cultivation in the Ganges valley. The U.P. alone raises more than 50 p.c. of India's raw sugar.

(c) The sugar-cane depends for its successful cultivation largely on richness of soil. Each harvest of sugar-cane exhausts the soil of the plant nutrient to a great extent. Unfortunately,

however, of the total crop grown only 18 p.c. is manured. As a result, the yield of cane is only 15 tons per acre.

There is, however, a great scope for the improvement in the yield of cane per acre. If chemical fertilizers are used along with improved varieties of cane, the yield can be doubled.

Thus it is apparent the country can produce more cane by increasing the *yield per acre* without increasing the area of cultivation. At the same time it must be remembered that mere increase in the average yield per acre will not help the sugar industry much unless at the same time the sucrose content in the cane is made higher.

Although sugar-cane is a quality product, its price in India is determined by the weight and not by quality and sugar content. The cultivators therefore feel encouraged to produce higher cane yields which actually result in lower sugar yields. The attitude should be to produce cane of improved quality for increased output of sugar.

Recently, improved varieties of sugar-cane are being raised almost in all provinces. It is also possible to introduce in India the methods of cultivation adopted in Java with suitable modifications to suit local conditions. Already a good amount of research work is being carried out in the various sugar-cane centres of India. The improvement of sugar-cane cultivation and the study of its pests and diseases are being carried on under the Indian Central Sugar-cane Committee.

Jute

Jute is the most important bast fibre of India and is an object of world commerce. Since partition, India has become a net importer of raw jute. "The demand for jute in the world's markets is based upon the fact that no cheaper fibre is procurable for bagging agricultural produce." The cultivation of the plant is restricted mainly to the Ganges-Brahmaputra delta in Bengal and Assam and in Bihar and Orissa, where the soil is enriched by alluvial deposits brought by river inundation favouring the growth of this exhausting crop without any expenditure on manure. Jute is sown from March to May and it grows to a height of ten to twelve feet. The harvesting period begins in July and extends to September. In West Bengal, sowing is

done in April and May, and harvesting time is mid-August to September. In Bihar and Assam, time of sowing is March to April while in Orissa, it is May-June.

Jute requires for its successful cultivation a hot damp climate in which there is not much rain in the early part of the season. It grows best on a loamy soil or rich clay and sand, although the bulk of the total quantity of jute grown in Bengal is cultivated on *chars* and sand banks and islands formed by rivers.

The fibre from the stem is separated after the plant is retted in a pool of stagnant water for 20 to 25 days according to the nature of the water. Though the usual practice is to do the retting in tanks and roadside stagnant pools, in some districts the plant is submerged in river also.

JUTE-GROWING AREAS IN INDIAN UNION

	Acres (000) 1936-39	Yield Average (000 bales) 1936-39	Acres 1949-50 (in 000)	Yield (1949-50) (in 000 bales of 400 lbs.)
West Bengal	.. 208	624	693	1452
Bihar ...	... 408	805	335	770
Orissa ...	... 18	40	54	151
Assam ...	... 200	474	259	717
Cooch Behar	. 32	69	—	—
Tripura	. 8	17	13	26
Total	. 874	2029	1159	3116

The acreage and production in the main jute growing areas in 1951-53 were as follows:

	Acreage (in 000)	Production (in 000 bales)
West Bengal	. 876	2,331
Bihar ...	... 487	956
Assam	. . 334	840
Total	... 1,834	4,680

The average yield of jute per acre is the highest in Bihar with 1149 lbs., followed by Assam 1056 lbs., Cooch Behar 1070 lbs., West Bengal 961 lbs., Tripura 945 lbs. and Orissa 800 lbs.

In Bihar over 90 per cent. of jute cultivation is concentrated in the district of Purnea; in Orissa more than 92 per cent. of

jute is raised in the Cuttack district; and in Assam jute is raised throughout the Brahmaputra valley.

Jute is produced mainly for foreign markets. The destinations of jute are U.K., Germany, Japan and U.S.A. Raw jute constitutes a small portion of the total jute exports. The principal

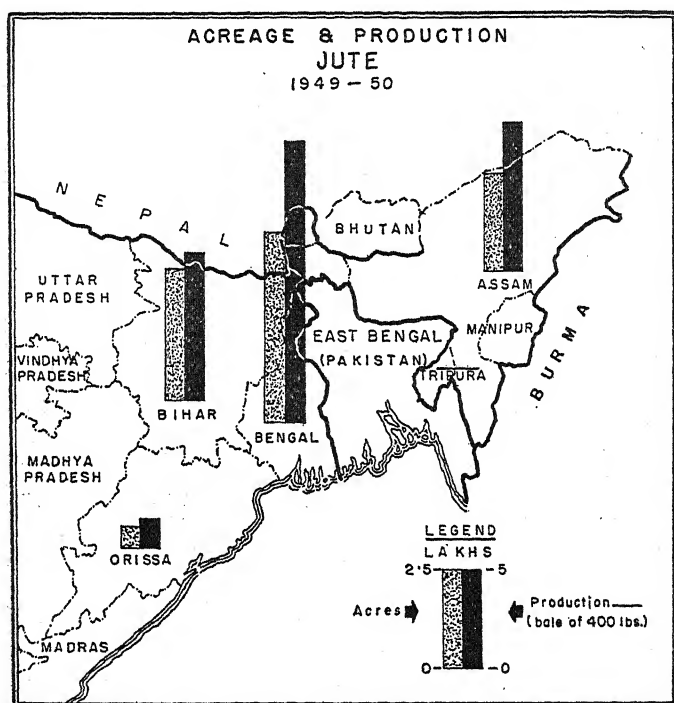


FIG. No. 28. In undivided Bengal less than 10 per cent. of the cropped area raised over 85 per cent. of the total Indian jute and, as such, the product exerted a tremendous influence on the economic life of the province. The main jute belt, which accounts for nearly four-fifths of the total acreage under jute in Bengal, is in Eastern Pakistan.

buyers of Indian jute are U.K., U.S.A., France, Italy, Brazil, Japan, Belgium, Germany and Spain. The U.K. alone takes nearly one-third of the total exports.

Immediately after partition in 1947, Indian Union had only 6.4 lakh acres of land under jute cultivation which gave a yield of 17 lakh bales of raw jute. In 1951-52, the yield was 47.7 lakh of

bales as against India's total requirements of 68 lakh bales. The gap between the production and requirement is met partly by the use of jute substitutes such as *mesta* and partly by imports from Pakistan. The Government is anxious to make the country self-sufficient in this fibre. Diversion of land from paddy is encouraged within limits; wasteland is being brought under cultivation; jute is being grown outside its natural belt. According to the Jute Agricultural Research Department, very soon 330,000 additional acres of land will be put under jute cultivation in the following areas:

West Bengal ...	...	100,000	Travancore ...	...	50,000
Bihar ...	...	50,000	Madras ..	...	20,000
Orissa ..	...	50,000	Cooch Behar .		5,000
Assam ...	...	50,000	Tripura ...	...	5,000

Active steps are also being taken to grow jute in the Uttar Pradesh so that her three mills may be self-supporting. Already 15,000 acres are under jute cultivation in U.P. in the Submontane tracts along the foot of the Himalayas which are fed by the rivers Sarju, Gogra, Sarda and Chawka and remain water-logged for at least nine months of the year. Bombay State has indigenous jute in certain of the coastal districts in addition, to jute substitutes. The fibres of all these plants, jute and jute substitutes, have been technologically tested and the results have proved that the fibres of the substitutes could be mixed with the Bengal jute successfully. The quality of the fibres of the indigenous jute is in no way inferior to that of Bengal jute. The question, however, is whether these jute plants and jute substitutes can be exploited economically or cultivated on a large scale like Bengal jute.

The Agricultural Research Institute has introduced *a new system of cultivation, as a result of which, not only has the cost of cultivation been lowered, but the yield and quality improved considerably.*

Jute is usually sown broadcast, and when the seedlings grow they are thinned out to ensure a rich crop. This system of cultivation involves wastage of seed and requires hand labour at the time of weeding. Under the new plan, jute is sown in lines, and not broadcast and the seeds are grown three to four inches apart in furrows drawn at intervals of one foot. In line-sown

jute all subsequent operations, such as periodical weeding between the beds, are done by means of wheel hoes.

As a result of the production drive the jute yield in the Union in 1953 is expected to be 50 lakhs of bales. To encourage further extension of jute cultivation, it is desirable that there should be fixation of minimum prices for jute in areas where jute growing may be unremunerative.

From April, 1948, India and Pakistan raised export duties by 33½ per cent. on raw jute and jute manufactures. The raising of duty on raw jute coming from Pakistan to Indian mills, coupled with the fact that Pakistan has not devalued her currency in line with India, will add heavily to the ultimate cost of jute manufactures in India. The increased cost of jute manufactures will adversely affect the exports from India and encourage the use of substitutes in consuming countries.

Hemp

There are three varieties of hemp in India—Sisal hemp, Sann hemp and Indian hemp. As a fibre, sann hemp is the best and is grown in Bombay, Madhya Pradesh, the Uttar Pradesh and the districts of Godavari, Kistna and Tinnevely in Madras. Large quantities of raw sann are exported to the U.K., Belgium, Italy, France and Germany. Indian hemp is more important for narcotics in the form of *bhanga*, *ganja* or *charas* than for fibre. As a source of fibre it is now grown in the North Himalaya region comprising Nepal, Simla, Kashmir, Kumaon and Kangra.

Sisal hemp has been least exploited commercially. It is grown in Tirhoot, Bombay and Southern India.

Cotton

Although India is the second most important cotton growing country in the world today and in ancient times was famous for its cotton cultivation, she produces only 9 per cent. of the world's output of cotton while her acreage is about 20 per cent. of the world acreage under cotton. Besides, the quality of Indian cotton is inferior. Indian cotton is of a medium staple and is good for coarse fabrics only. Cotton holds the first place among the commercial crops of India and occupies about 5 per cent. of the cropped area.

Cotton has a considerable climatic range. It grows in the dry region of Bombay as well as in the moist province of Bengal. Generally speaking, it is a dry-region crop and flourishes where the rainfall is less than 40 inches. The soil is equally important. The sticky black soil of the Deccan is ideal for cotton cultivation. Cotton is cultivated in Bombay, M.P., Berar, Madras, U.P., Hyderabad, Madhya Bharat, Baroda, Rajputana and Mysore. Half the total area is confined to Bombay and Berar. The yield of cotton in India ranges from 60 to 90 lbs. per acre in the rain-fed areas, and 180 to 200 lbs. per acre in the irrigated areas, whereas in the U.S.A. it is 267 lbs. per acre and in Egypt 390 lbs. There are

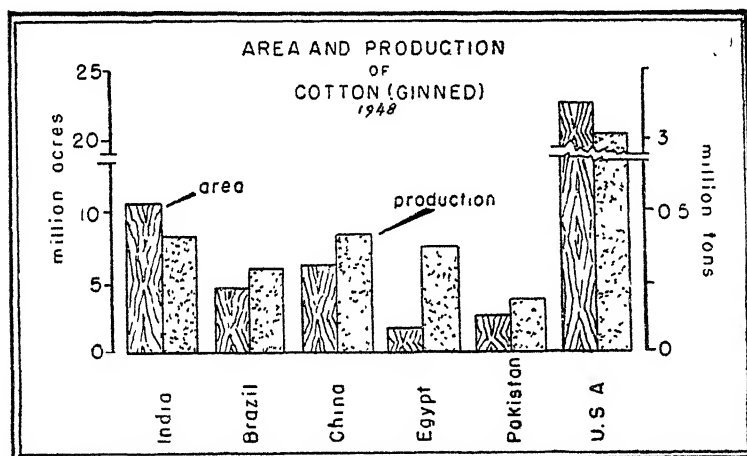


FIG No. 29.

two varieties of cotton in India: (i) The Indian or short-staple cotton and (ii) the American cotton.* The bulk of the production comes in the shape of Indian cotton. In recent years, some progress has been made in the Indian Union in the production of long-staple cotton.

In India, cotton is considered long-stapled when the fibre is one inch long. When the fibre is below $7/8$ inch and about $11/16$ inch, it is medium staple. The fibre which is $11/16$ inch and below is short staple.

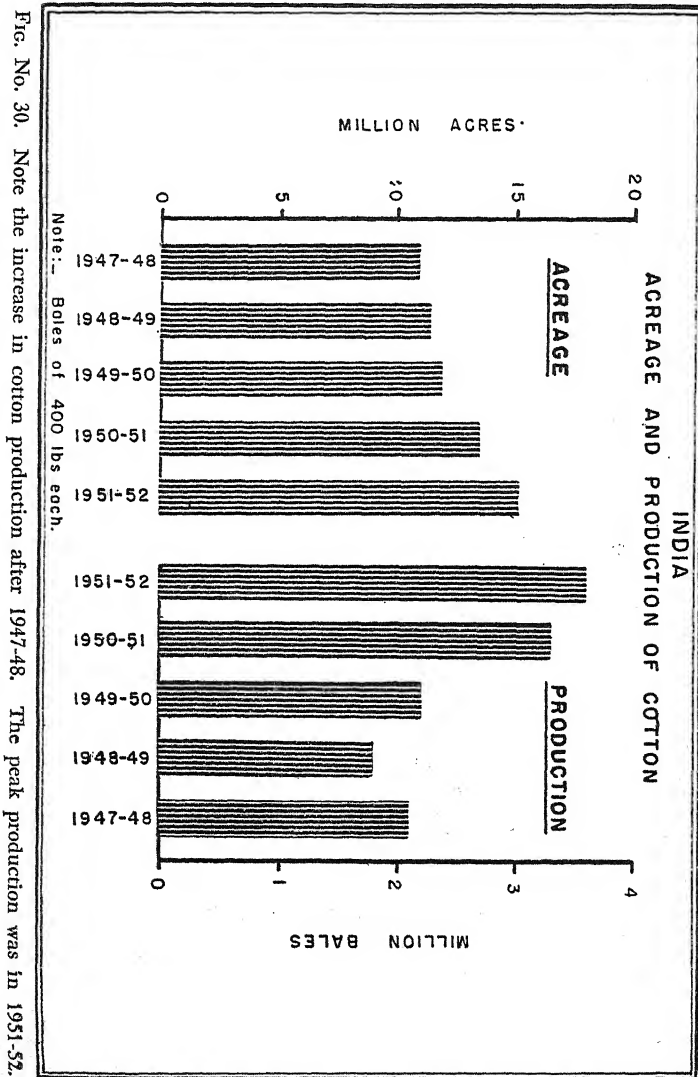
* The commercial varieties of Indian cotton are known as Bengal, American, Oomras, Surti and Dholleras. About one-third of the Indian cotton belongs to Oomras variety.

Areas of short-staple

M. P., Berar, Khandesh,
Madhya Bharat, Rajputana,
U. P.

Areas of long-staple

Gujrat, part of Kathiawar,
Southern Bombay, large por-
tions of Madras.



The area under cotton in the Indian Union in 1950-51 was 13.8 million acres and production 2.9 million bales (of 400 lbs. each) consisting of long-staple 6 lakhs, medium-staple 17 lakhs

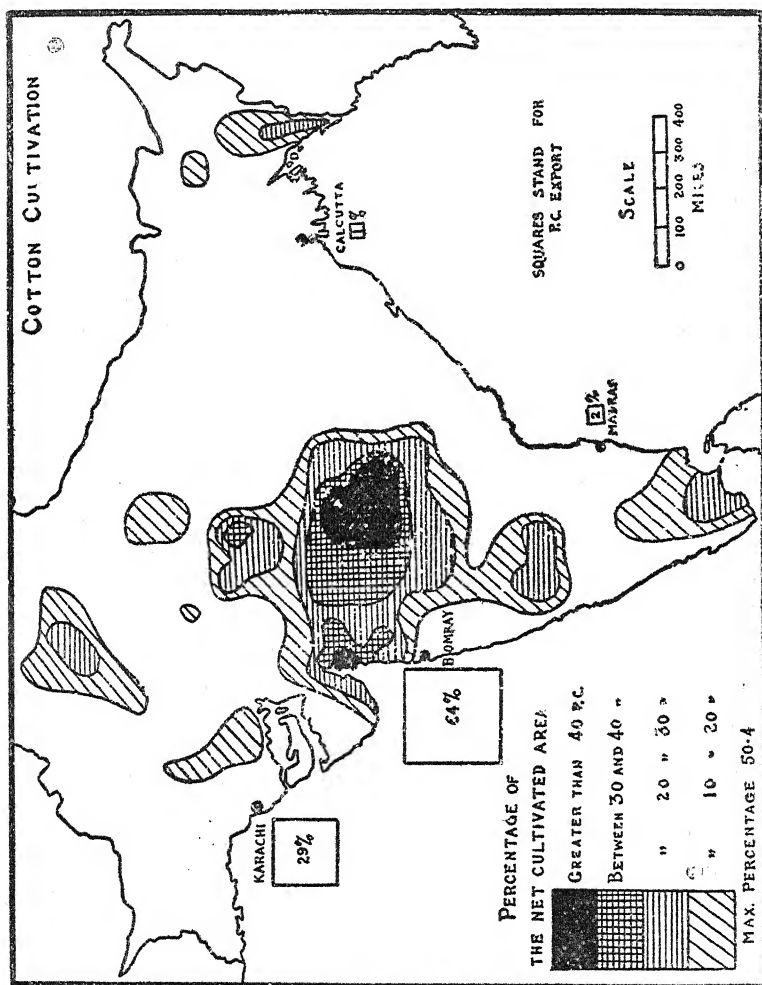


FIG. No. 31. Cotton cultivation is mostly confined to the *Black Soil* region of the Deccan comprising southern Sourashtra, Madhya Pradesh, Berar and Hyderabad.

and short-staple 8 lakhs. The home production of long-staple cotton is not sufficient for mill requirements and India has to import $1\frac{1}{2}$ million bales of long-staple cotton annually.

The Five-Year plan of India has fixed a target of additional production of 12 58 lakh bales of cotton to be achieved by 1956.

The Central Cotton Committee is engaged in improving cotton cultivation in India. The Committee raises a cess of two annas a bale on all cotton produced in India to meet its necessary expenses.

Before the partition, India was the second largest cotton-exporting country in the world. The chief consumers of Indian raw cotton were Japan, United Kingdom, Italy and China. Japan occupied the most dominant position among the consumers of Indian cotton, taking more than 60 per cent. of India's total export of cotton. This was due to the gradual development of cotton industry in that country. Japan was not in a position to grow cotton and depended for her supply of the raw material partly on India and partly on the U.S.A. Among the European countries, Germany used to take large quantities of Indian cotton before the World War II. The export of raw cotton has now greatly declined because of the *partition*. In 1952-53 India exported 71,000 tons of raw cotton against 2.7 million bales in 1938-39. The important buyers of Indian cotton are U. K., Hong-Kong, Australia, New Zealand, Holland, Belgium, France, Japan, Canada and Germany. Japan is once again the chief buyer as more than 52 p.c. of our raw cotton exports go there.

The need for increasing the cultivation and production of cotton in the country is indeed great. India cannot now afford to spend foreign exchange for the purchase of raw cotton. There is considerable scope for cotton cultivation in Rajasthan, Madhya Bharat and Madhya Pradesh. Already because of the Central Cotton Committee, the production of long-staple cotton has gone upto 28 per cent. from 13 p.c. of the total production. With better facilities for irrigation, the cotton area is likely to increase further.

Oil-seeds

The trade in oil-seeds is very recent in India. Oil-seeds are in demand not only for salads and food, but also for preparing medicines, perfumeries, varnishes, lubricants, candle, soap manufactures and other purposes. The principal oil-seeds found in India are linseed, groundnut, cotton-seed, rape-seed, castor, sesamum-seed, copra, mowra-seed and polly-seed.

India is one of the leading oil-seed producing countries of the world. With the exception of palm kernels, olives and soya beans, she raises all the principal oil-seeds for world trade.

A large quantity of seeds is exported annually and this export forms a big item in India's foreign trade, and it occupies the fifth place among the exports. It is felt that India does not yet make the best use of her oil-seeds resources, though attempts have been made to develop local oil-crushing industry.

During recent years, however, our exports have considerably declined in respect of oil-seeds. The increased demand for oil-seeds in the country for cooking and industrial uses such as Vanaspati, soap manufacture, varnishes and lubricants is mainly responsible for the decline in exports. Secondly, Brazil, Argentina and the United States of America have increased their production of oil-seeds and therefore compete with Indian products in the foreign market. Thirdly, Indian castor-seed has failed to compete with the Brazilian counterpart while exports of linseeds have come down due to the inability of India to offer it at attractive prices vis-a-vis Canada and South American countries.

PRODUCTION OF OIL-SEEDS*

(in 000 tons)

Seeds	World production	Indian production (1948-49)	Indian production as p c. of World production
Groundnut	5,000	3,073	61.5
Sesamum	1,100	295	26.8
Castor	500	109	21.8
Rape seed	4,800	726	15.1
Linseed	2,900	439	15.1

Oil-seeds occupy about 8 per cent. of the net area sown under all crops, and the production exceeds seven million tons annually.

It is necessary to stimulate further production of oil-seeds in the country in order to meet the increased demand for local consumption as well as for earning foreign exchange by export.

But since there is also the urgent need for exploiting all available lands for food crops, the increase in the production of oil-seeds will have to be made either in lands which are not usually

* The Indian Central Oilseeds Committee (1949).

suitable for food crops or in off seasons. Thus in Bombay and Uttar Pradesh (United Provinces) it is possible to grow the early variety of groundnuts before the *rabi* crops. In Madras groundnuts and Til-seeds can be cultivated immediately after the paddy crops. In Mysore, an increase in the production of groundnuts is likely in the cotton belts. There are also great possibilities of developing groundnut cultivation in the Punjab (East Punjab) and PEPSU.

At present, the demand for oilseeds arises mostly for making oils and fats (edible oil). Efforts should also be made to use more and more non-edible seeds like mohwa, neem, Karanga and castor for industrial purposes to relieve the demand on edible seeds for similar purposes. It may be possible to get oil out of sal-seeds in Orissa.

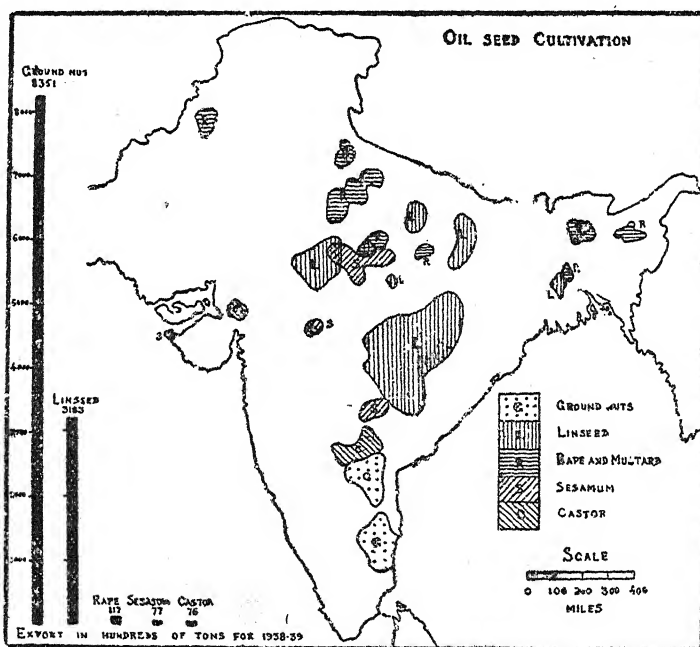


FIG. No. 32. Distribution of oil-seeds in the country. The groundnuts are practically the products of the Peninsular India.

Linseed :—India is the second largest linseed-producing country in the world. Although it is one of the oldest fibre plants of India, linseed is cultivated for its seeds only. The plant

requires the same kind of land as wheat and is grown as soon as the monsoon is over. The harvesting begins in February.

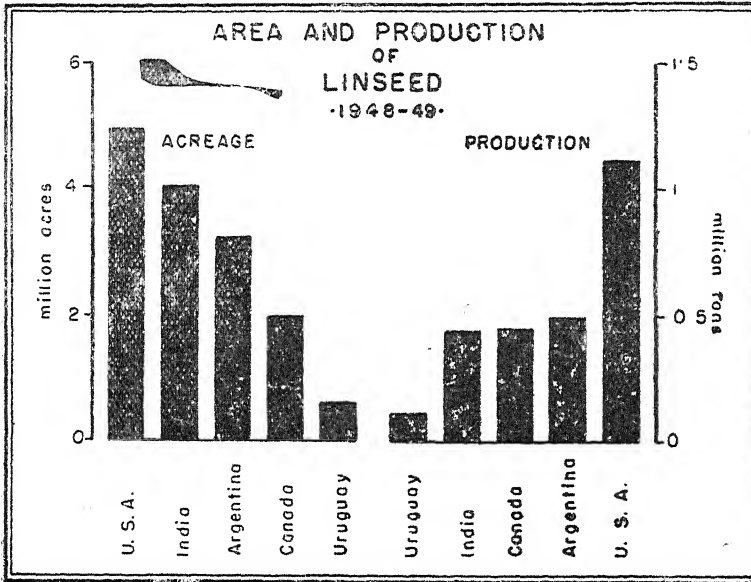


FIG. No. 33.

Linseed is mainly a rain-fed crop. The average rainfall between 30 and 70 inches per annum is best suited for its cultivation. Linseed is cultivated for its seeds mainly in Madhya Pradesh, Bihar, Orissa, the Uttar Pradesh, Bombay and West Bengal. It is also cultivated in Hyderabad, the East Punjab and Kotah. The Uttar Pradesh is the leading producer followed by Bombay.

AREA UNDER CULTIVATION OF LINSEED

		Area 1949 (in 000 acres)	Yield in 1949 (in 000 tons)
Madhya Pradesh	...	1,116	97
Uttar Pradesh	...	177	161
Bihar	...	374	71
Madhya Bharat	...	397	22
Rajasthan	...	221	10
Hyderabad	...	474	43
Vindhya Pradesh	...	168	25
Total Indian Union	...	3,125	432

The export of linseed has declined to insignificant quantity. In 1952-53 only 68 tons of linseed were exported against 68,000 tons in 1950-51. About 28,000 tons of linseed oil valued at Rs. 5 crores were exported in 1952-53.

Practically all the products are exported to the United Kingdom, Italy, Holland, Australia and New Zealand.

As regards exports, Argentina is a formidable competitor of India.

Rape-seed, the Indian name of which is *Sarson*, is grown with wheat. It is often confused with mustard (Rye). Its cultivation is restricted to the northern part of India, and the principal areas are the Uttar Pradesh, West Bengal, East Punjab, Bihar and Orissa. The Uttar Pradesh alone supplies more than 50 per cent. of India's total. Rape-seed is exported to the United Kingdom, Italy, Belgium and France.

Groundnut :—India is the largest groundnut-producing country in the world followed by French West Africa, China,

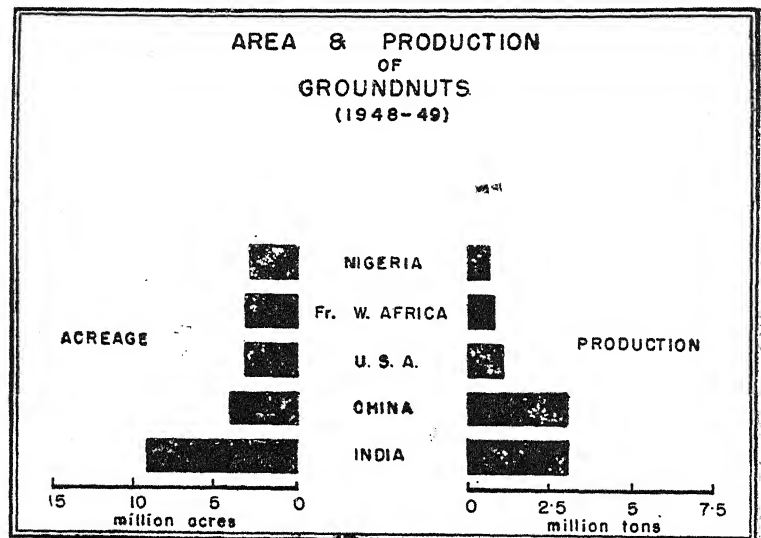


FIG. No. 34. The production in 1950 almost reached the level of 1928-29.

U. S. A. and Indonesia. It is essentially a tropical product and as such is grown extensively in peninsular India. The crop is sown in May-August and is harvested in November-January. It

is grown mostly in Madras, Bombay, and Hyderabad. Recently groundnuts have been introduced in Madhya Pradesh and Chotanagpur.

PRODUCTION OF GROUNDNUTS IN 1949-50

	Area (in 000 acres)	Yield (in 000 tons)
Madras ...	3,863	1,646
Bombay ...	1,934	731
Madhya Pradesh ...	675	163
Hyderabad ...	1,619	406
Mysore ...	272	41
Total India ...	8,363	2,987

In 1952-53, India exported 13,000 tons of ground-nuts as against 38,000 tons in 1950-51. Bombay handles three-fifths of total exports of groundnuts followed by Madras and Kutch ports.

Canada, Switzerland, Holland and Norway are the chief buyers of Indian groundnuts.

The export of groundnut oil, however, has increased considerably. In 1952-53, India exported 67,000 tons of groundnut as against 21,000 tons in 1950-51. Normally the principal buyers are France, Belgium, Australia, Hungary, Germany, Italy and the United Kingdom.

Sesame seed :—The cultivation of sesame in India dates back earlier than the Christian era. India is the largest sesame-

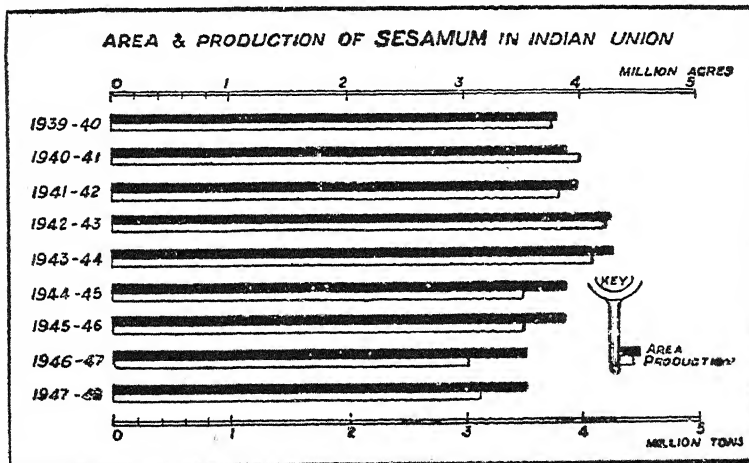


FIG. No. 35. Note the gradual decline in acreage.

producing country in the world. The Uttar Pradesh is the leading producer. About 4 million acres of land are under sesamum cultivation.

The plant is grown on light and sandy soils, although some of the varieties in India do well on the black cotton lands. The seeds are exported to the United Kingdom, France, Belgium, Germany, Italy and Egypt.

Its importance as an article of export has declined considerably. The Indian Union exported 2,300 tons of sesamum seed.

Castor seed :—India holds a virtual monopoly in the production of the castor seed, although small quantities are also cultivated in Manchuria, Indo-China, Brazil and Java.

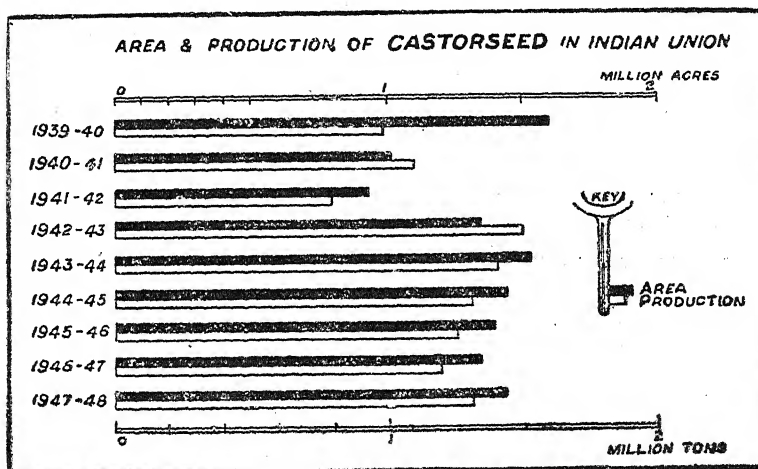


FIG. NO. 36. Note the sudden rise in production in 1942-43.

The castor plant requires warm climate. "A fair amount of moisture and rainfall after sowing is essential to ensure good germination; but after the root system has developed, less moisture is needed." It does well on land where maize is cultivated. The plant acquires a height of 20 to 30 feet.

The plant is cultivated chiefly in Madras, Hyderabad, Bombay and Madhya Pradesh. A little above 1 million acres of land are under castor plants in India.

India does not export much castor seed. In 1952-53, India exported 4,000 tons of castor seeds. Export of castor oil, on the

other hand, is considerable. In 1952, the Indian Union exported about 38,000 tons of castor oil while in 1950 the exports were about 24,000 tons only.

The principal buyers are the United Kingdom, France, the United States of America, Belgium, Italy, Germany, and Canada. The U.S.A. takes about 75 per cent. of our castor oil exports followed by U.K. with 15 p.c.

Cocoanut and Copra :—Cocoanut is a very important source of vegetable oil. The tree is widely grown in islands and near the sea-sides of tropical lands. High temperature and heavy rainfall on alluvial lands are the ideal conditions for its growth. The tree takes 5 to 10 years to mature after which it continues bearing fruits for about 80 years. Each tree yields on an average 50 to 70 fruits per year. The chief products of the cocoanuts are copra and coir fibre.

Copra is the commercial name for the kernel of the cocoanut, broken into small pieces and dried in the sun. The kernel of the cocoanut contains oil, which is an important article of commerce. This oil is edible and used for cooking purposes and for the manufacture of margarine and other butter substitutes.

There are 1·5 million acres of land under cocoanut cultivation in India. Madras, Travancore, Cochin and Mysore account for the bulk of the cocoanut acreage, while Orissa, Bombay, West Bengal and Assam also contribute to it. In Madras, three-fourths of the acreage under cocoanut are in the districts of Malabar and South Kanara and East Godavari. In the Travancore State, the cocoanut tracts are found in the lowlands and the middle area. Cochin State raises the tree mostly on a narrow strip of sandy tract on the western sea-board. The biggest cocoanut area of the Mysore State are found in Tankur district followed by Hussan, Mysore, Chitaldrug and Kadur. In Orissa, the greater concentration of cocoanut tracts is in the districts of Puri and Cuttack. The two districts of Ratnagiri and Kanara contain nine-tenths of the cocoanut acreage of Bombay.

The cocoanuts are important in India for a variety of purposes. Tender nuts are in demand for the milky fluid inside, which provides a refreshing drink. Mature nuts are used mainly for four purposes : (i) for making copra, (ii) for religious offerings, (iii) for edible purposes as fresh kernel, and (iv) for raising seedling.

About 45 per cent. of India's production of mature nuts is utilised for making copra, while an equal quantity is used also for edible purposes such as curries, chutneys, sweets, puddings etc.

Cotton seed :—The importance of cotton seed as a source of oil was not fully appreciated till late in the 19th century. The oil is used in cooking, in pharmacy, in the preparation of lard and margarine, and as a substitute for olive oil.

Bombay, the East Punjab, Madhya Pradesh, Hyderabad and Madras are the chief producers. The total yield of cotton seed is a little above 1 million tons.

Other seeds raised in India include poppy seed, mowra seed and niger seed.

Rubber

Rubber plantation was first introduced in India in 1902 on the banks of Periyar in North Travancore. The credit of initiating the cultivation of rubber in India belongs to the late Marquis of Salisbury when Secretary of State for India in 1900. The seeds secured in South America—*Amazon Para Rubber*—were sent here for the purpose of introducing the industry. The industry continued to develop till 1929 when the world-wide trade depression put a stop to further expansion. With the spread of war in the south-east Asia during 1941-45, the Indian rubber industry revived its activities to a great extent.

Indian Union produces nearly 16,000 tons of rubber annually or just above 1 per cent. of the total world output of natural rubber. Of the Indian production, not more than 50 per cent. is first grade rubber, the rest being lower grades. Rubber is mainly grown in the southern part of India. Madras, Coorg, Mysore, Travancore and Cochin are the principal producers of rubber. About 170,000 acres of land are under rubber cultivation in India. The average yield per acre is about 258 lbs. of raw rubber.

TOTAL AREA UNDER RUBBER CULTIVATION (1950)

Madras	...	...	31,000	Cochin	.	.	14,000
				Coorg	..	.	3,000
Travancore	...	...	123,000	Mysore	.	.	4,000

In Southern India, communications are well developed, and there is never any scarcity of labour in the plantations. The rubber plantations employ more than 30,000 people in India.

Indian rubber is mostly raised for foreign markets. The principal recipients of Indian rubber are the U. K., Ceylon, Holland, Straits Settlements and Germany. The United Kingdom alone takes more than 35 per cent. of our rubber export. Cochin is the principal port through which rubber is exported.

The International Scheme for the regulation of production and export of rubber came into operation on the 1st June, 1934. The scheme had its aim to regulate the production and export of rubber in order to reduce existing world stocks and maintain an equitable price level, reasonably remunerative to efficient producers.

During the Second World War, the Government of India stopped all exports of rubber and itself purchased the entire output. The internal market for rubber has expanded considerably after 1939. In fact, the production of rubber is still on increase to meet the demand. About 5,000 tons of rubber come from abroad annually to India even though its prices are higher than that of Indian rubber.

The Indian Rubber Board which is constituted under the provisions of the Rubber Act 1947 is concerned with the production and marketing of the rubber industry. The Board also advises the Government on matters relating to imports. The price of rubber produced in the country is fixed statutorily. The Board is financed by a cess levied on all rubber produced in the country and fees levied for licences issued to dealers and manufacturers.

QUESTIONS

1. What are the chief areas in India where tobacco and silk are produced? Describe the climatic conditions which favour their growth. (Cal. Inter, 1933).
2. Name five important oil seeds of India describing the areas where they are grown and the uses to which they are put. (Cal. Inter., 1933).
3. Examine the importance of any four of the following: (a) Groundnut, (b) Linseed, (c) Rice, (d) Wheat, (e) Jute and (f) Cotton. (Cal. Inter., 1934, '38).
4. What are the economic effects of export of oil seeds from India? To what countries are these oil seeds exported and to what use are they put there? (Cal. Inter., 1927).

5. Discuss the conditions favouring the growth of (a) Tea, (b) Coffee and (c) Sugar-cane. Indicate the places where they are grown. (Cal. Inter., 1936).
6. Name the two important fibres produced in India. Give an account of the conditions favourable for their large-scale production. (Cal. Inter., 1945).
7. What are the uses of jute? How is it that jute is produced only in India? (Cal. Inter., 1944).
8. Briefly narrate the conditions favourable for the growth of rice and wheat. What parts of India are best suited for the production of these crops? (Cal. Inter., 1943).
9. Give an idea of wheat, cotton and jute-belts of India. State briefly the climatic conditions necessary for the production of these commodities. (Cal. Inter., 1941).
10. For making India self-sufficient in the matter of food, what planning would you advocate? (Cal. B.Com., 1949).
11. Draw a map of India showing the areas producing sugar-cane, tea and coffee. (Cal. Inter., 1948).
12. India is suffering both from the shortage of rice and jute. What would be your suggestions to increase the supply of both but not at the cost of each other? (Cal. B.Com., 1951).
13. For making India self-sufficient in the matter of food what planning would you advocate? (Cal. B.Com., 1949).
14. On a sketch map of the Indian Republic, show the important regions of production of food grains. How is it that the shortage of foodstuffs is being felt in many parts of the country? (Delhi B.A. Hons., 1950).

CHAPTER IV

IRRIGATION WORKS AND MULTIPURPOSE PROJECTS

As India is essentially an agricultural country, the need for a sufficient supply of water is always great. The *Monsoon* usually supplies water to Indian districts ; but there are certain drawbacks in the character of the monsoon. These are:

(i) Uncertain rainfall: In Rajputana and many parts of the East Punjab rainfall is uncertain.

(ii) Ill-distribution: In the Deccan, rainfall is not only scanty but ill-distributed.

(iii) Absence of winter rain: Cultivation in winter requires artificial water-supply in the absence of winter rain.

(iv) Certain crops require more water than rainfall can supply, *viz.*, sugar-cane and rice.

Man is unable to control rainfall in which either deficiency, irregularity or super-abundance may give rise to disastrous famines. He can, however, provide measures which reduce famines. The chief among these is the extension of irrigation. Irrigation means supply of water to the fields by means of canals from rivers or from storage tanks for the purposes of agriculture. Irrigation has been practised in India since time immemorial.

Irrigation has played a very important part in the rural economy of the different provinces of India. Irrigation is necessary in all parts of the country where the mean annual rainfall is less than 50 inches. This applies to Rajputana where the rainfall is less than five inches in a year, to Uttar Pradesh, parts of Madhya Pradesh, Bihar and Orissa and over the whole of the Deccan Plateau, except a range along the western coast.

The area irrigated in the Indian Union is about 48 million acres of which grain crops occupy more than 30 million acres. This is the largest area which is irrigated in any country of the world.

The irrigated area is distributed as follows:

Himalayan region	..	2.6 million acres.
Northern Plains regions	..	25.2 "
Peninsular Hills and Plateau region	.	9.3 "
Western Ghats and Coastal region	...	1.6 "
Eastern Ghats and Coastal region	...	10.0 "

There are three main kinds of irrigation works in India: wells, tanks and canals.

(i) **WELLS:** About 20 per cent. of the total irrigated area in India is irrigated by means of wells. The construction and maintenance of wells have been mainly the result of private enterprise. Water is raised from wells either by manual labour, bullocks, water-lifts, the Persian wheels or by means of oil engines. Well-irrigation is extensively used in the Uttar Pradesh, the East Punjab, Madras, Bombay, Rajputana, etc. Irrigation through surface percolation wells is fairly common throughout the East. One of the disadvantages of irrigation by wells is that the water has no fertilising property in itself unlike the canal water which carries large quantities of fertilising silt to the fields they irrigate. It is therefore necessary to use manure on soil irrigated by wells. The Government of India and the State Governments are now supplying manures, both organic and artificial, for securing maximum yield of crops from the fields irrigated by wells.

(ii) **TANKS:** Tanks are really hollows, natural or artificial, in which rain water is collected and stored up. Tank irrigation is prevalent in Madras, Mysore and Hyderabad. Nearly 8 million acres of land are irrigated by tanks.

(iii) **CANALS:** This is the most important type of irrigation in India. Canals may draw their water either from rivers or from artificial storage. Canals are mostly constructed in Northern India, where the rivers have flow of water throughout the year. Storage canals are constructed in the Deccan, Madhya Pradesh and Bundelkhand. Here the rivers dry up during the hot season and, therefore, artificial storage is necessary. Rain water is stored across a valley by building a dam and then distributed to the neighbouring lands by means of canals. About 20 million acres are irrigated through canals.

River canals may be of two classes: (a) Inundation canals and (b) Perennial canals. The inundation canals obtain water when the river rises above a certain level. Thus the canals depend for their supply of water on the natural flood level of the river. When the level is low, canals do not obtain water, but when the river is in flood, they permit widespread cultivation. Irrigation is thus suspended from October to April when the level of the water is low. During this period cultivation is practised

with the help of well-irrigation. To remedy this defect perennial canals are constructed.

The perennial canals draw their water from rivers which have their flow of water throughout the year. Some form of barrage is put across a river and its water is diverted by means of canals to the neighbouring areas. The great canal systems of the U. P. are of this type. Many of the inundation canals are being transformed now into perennial canals. By perennial irrigation, agricultural production in the "uncertain zone of rainfall" has been enormously increased, for unlike the inundation method it allows full advantage to be taken of in the hot season and so permits cultivation all the year round.

The conditions are excellent for developing irrigation in the East Punjab. The province is flat, with soft alluvial soil. The development of canal irrigation has transformed large areas of semi-deserts into fertile agricultural lands.

The important canal systems in the East Punjab are:

(i) The Western Jumna Canal takes its water from the Jumna river and irrigates the districts of Rohtak and Hissar (South East) and the States of Patiala and Jhind. More than 8,90,000 acres of land are irrigated by 1900 channels of the Canal.

(ii) Sirhind Canal takes its water from the Sutlej river at Ruper and irrigates the districts of Ludhiana, Ferozepur and Hissar, and Nabha. The canal was opened in 1862, and for many years after suffered very seriously from the most aggravated form of silt trouble. Slowly, the headworks were modified to overcome the difficulties. Today, this canal is one of the most stable in all India.

(iii) The upper Bari Doab Canal takes its water from the Ravi river at Madhopur and irrigates the districts of Gurdaspur and Amritsar. This canal is extended to Pakistan. In winter the supply of water in the Ravi is not sufficient for the requirements of the Upper Bari Doab Canal and for months together not a drop is allowed to pass below Madhopur.

In Madras about 7 million acres of land are irrigated by tank-canals. The percentage of the area irrigated to the total area sown in Madras exceeds 30. Canals take their water from the Godavari, Kistna and Cauvery. The Periyar canal system is one of the best examples of irrigation that exist in Southern India.

The flat land around Madura covering an area of 1,33,000 acres, is watered by the Periyar river.* The Mettur irrigation system on the Cauvery river is the biggest in the Union and "the largest single block masonry reservoir in the world with a storage capacity of 93,500 million cubic feet".

The prosperity of the Uttar Pradesh is largely due to the great irrigation works. Irrigated regions cover nearly 22 per cent. of the area sown. Rainfall in the Upper Ganges valley is under

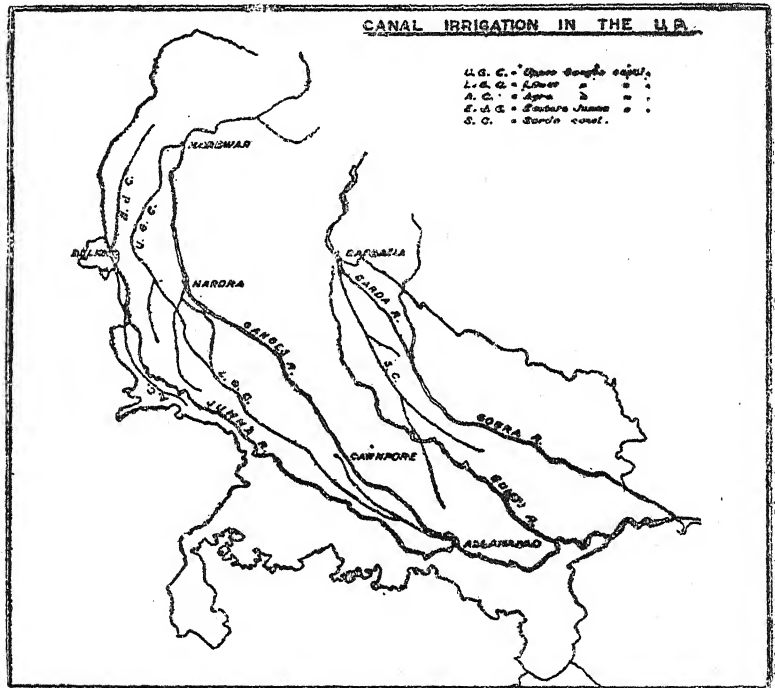


FIG. No. 37. Note the absence of irrigation in the south west of U. P.

40 inches and irrigation is of vital importance. There are five large canal systems in the province.

(i) The Upper Ganges Canal was completed in 1854 and has its headworks at Hardwar. It irrigates over 1,00,000 acres of land and is the most important system of the province. The main canal

* The Periyar is a small river in the Western Ghats of the Madras Presidency whose water is drawn to the eastern part of the hills by means of a tunnel.

is 213 miles long with branches and distributaries totalling 3,400 miles. It also supplies water to the Agra canal and the Lower Ganges canal.

(ii) The Agra Canal was opened in 1874 and is taken off from the Jumna near Delhi. It irrigates over 2,60,000 acres of land.

(iii) The Lower Ganges Canal was completed in 1878. It is taken off at Narora in the district of Bulandshahr. The total length including channels exceeds 3,000 miles. It irrigates over 8,00,000 acres of land.

(iv) The Sarla Canal is the largest productive canal of the province. It was completed in 1928. Its mileage including distributaries is over 5,500. The headworks are situated at

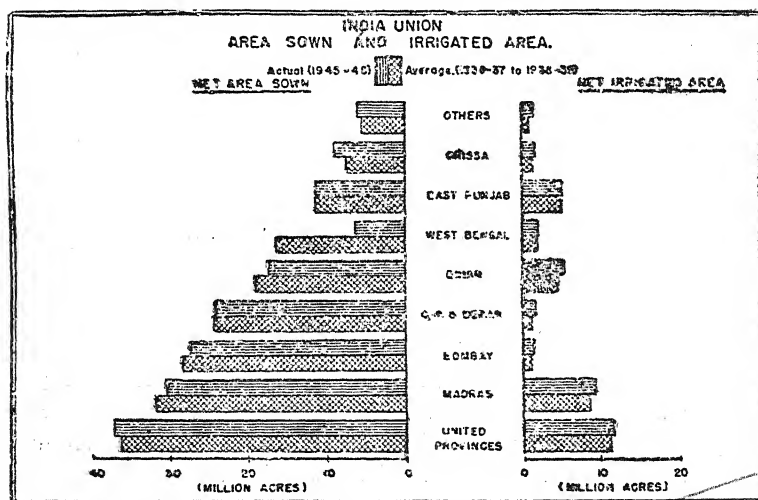


FIG. No. 38. Note the importance of irrigation in U.P.

Banbansa on the border of Nepal. It irrigates Rohilkhand and the western part of Oudh. The Sarla system commands an area of about 60,00,000 acres of land.

(v) The Eastern Jumna Canal serves the north-eastern part of the province. The canal takes the water from the Jumna near Faizabad.

The progress of irrigation in India is not rapid. Irrigated areas cover only 18% of the total sown area in India. There is a great scope for irrigation in West Bengal, Bihar, Orissa, southern Uttar Pradesh and the whole of Peninsular India.

In West Bengal, only about 2,75,000 acres are irrigated by canals out of the total cultivated area of 12.1 million acres. The need for irrigation facilities is urgent as at many places in the districts of Birbhum, Bankura, Burdwan and Midnapore, the rainfall is much below the quantity required for cultivation.

THE EXTENT OF IRRIGATION IN INDIA

	P.c. of cultivated area to total area	P.c. of irrigated area to cultivated area	P.c. of irrigated area to total area
Madras	46	26	12
U. P.	68	27	18
Bombay	61	4	2
Bihar	52	22	12
Mysore	35	16	6
Orissa	34	22	8
Madhya Pradesh	43	6	3

As extension of canal system involves heavy cost for construction; its development will depend on the Government policy and the state of finances.

The Multi-purpose Projects

Although India leads the world in irrigation, there is urgent need for further extension of irrigation facilities to many areas to step up production of food which has of late fallen below requirements. It has been estimated that out of the total quantity of water available in the rivers of the country and the sub-soils only six per cent. has so far been utilised for irrigation and the rest runs to waste and in its progress to the sea does incalculable damage to life and property through uncontrolled floods. On a rough calculation the mean annual supply of water in the rivers of India is of the order of 2.3 million cubic feet per second. The mean annual utilization of water for agricultural and other purposes through canals is roughly 133,000 cubic feet per second.

Recently several projects have been undertaken by the Central and Provincial Governments for power and irrigation in India. *The projects are being so designed as to provide not only for irrigation, but also for hydro-electric power, flood control, naviga-*

tion, recreation facilities and fish culture. Hence these projects are also known as multi-purpose plans. After the completion of these plans, India will be using about 10 p.c. of her latent water-power capacity, and about 28 million acres of land will become available for cultivation.

For the purpose of planned development India can be divided into the following river basins:

- (i) The river-system of the East Punjab which was formerly part of the Great Indus basin.
- (ii) The Central Ganges basin between its sources and the eastern borders of the Uttar Pradesh.
- (iii) The Eastern Ganges basin drained mostly by its northern tributaries.
- (iv) The Brahmaputra system of Northern Assam.
- (v) The Hooghly basin which comprises parts of Eastern Bihar and almost the whole of Western Bengal.
- (vi) The Orissa river system bounded on the north by the watershed of the Subarnarekha and on the south by the Mahanadi.
- (vii) The Godavari system with its tributaries draining into the Bay of Bengal.
- (viii) The Krishna system which covers some of the dry districts of Central and Eastern Madras. The Krishna Dam site is near the confluence of the Krishna and the Tungabhadra.
- (ix) The Cauvery System.
- (x) The Madhya Bharat river system of the Tapti and the Narbada.
- (xi) The Malwa river system skirting the Eastern borders of Rajputana and centring round the Chambal which drains to the Jumna.

For the development of some of these river-valleys, the Central Government have in hand the following multi-purpose projects:—

- (a) The Damodar Valley Project (of the Hooghly basin).
- (b) The Koshi Project (of the Eastern Ganges basin).
- (c) The Hirakud Project (of the Orissa river system).
- (d) The Tapti-Narbada Project of Madhya Bharat.
- (e) The Rihand Project.
- (f) The Tungabhadra Project (of the Krishna System).

The estimated cost of the six projects is Rs. 232 crores and they will irrigate 12 million acres of land.

These projects will not only provide irrigation and generation of electric power for industrial purposes, but will also control flood and malaria, navigation, land reclamation, fish culture, etc.

In addition, there are provincial projects like Mor river (West Bengal), Ramapadasagar (Madras), the Bhakra and Nangal projects of the East Punjab. The Mor river project of Bengal will take about 2 years to complete and will bring 600,000 acres under irrigation. The Rampada Project aims at irrigating 2.5 million acres of land.

Damodar Valley Project

The Damodar Valley with its surrounding area is the most highly developed industrial region in India. In it are situated India's two largest iron and steel plants (Jamshedpur and Burnpur), her largest fertiliser plant (Sindri), the Government Locomotive Works (Chittaranjan) and Cement Works.

The Damodar (also known as the River of Sorrows) is 336 miles long. It takes its source at the hills of Chotanagpur at an elevation of 2,000 feet. After flowing for 180 miles in Bihar it enters West Bengal and ultimately joins the Hooghly.

In its upper valley lie parts of Hazaribagh, Palamau, Ranchi, Manbhum and Santal Parganas in Bihar. Here the rainfall is about 47 inches annually, most of which fall during the monsoon. "Torrential rains crash down upon the deforested hills, and the unimpeded rain-water tumbles down the hills into the river. The unchecked flow erodes land in Chotanagpur and swells the volume of water in the river."

The lower portion of the valley lies in West Bengal, where the flooded Damodar overflows its banks, destroys crops and dwellings, carries away men and cattle, disrupts communications and dislocates temporarily the economic life of the valley.

The river can be made to work for multi-purpose development. If properly tamed, it can become a source of wealth and power to Bihar and West Bengal.

The Damodar valley project aims at providing water for irrigation and navigation, controlling malaria, introducing scientific management of land and promoting actively the economic develop-

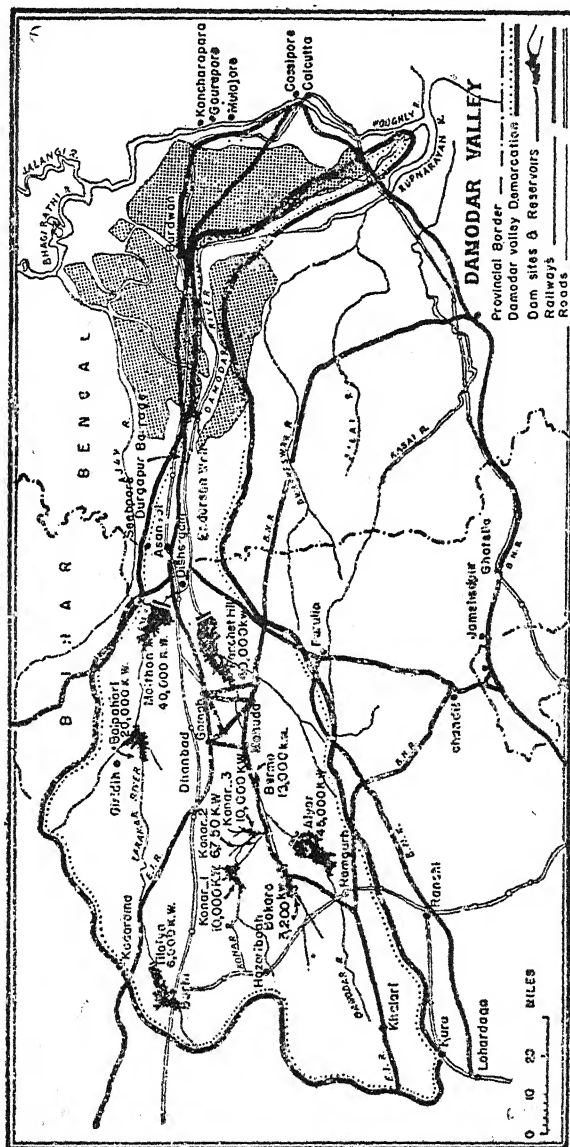


FIG. No. 39. Adequate supplies of power added to the existing natural resources in the valley will attract new industries to the area and permit the expansion of existing ones.

ment of the entire basin. The project will provide perennial irrigation to three quarters of a million acres and generate 300,000 k.w. of power.

The upper Damodar basin is very rich in timber, lac and tussore. The lower basin though very fertile is without proper system of irrigation for which intensive cultivation is not possible. The Damodar Valley contains the largest coal deposits of India and considerable quantities of bauxite and aluminium. The valley has also fire clay, china clay, mica, limestone, lead, silver, antimony and quartz. With cheap electric power, these minerals can be properly exploited.

The Government of India has set up by an Act a Corporation to implement the Damodar Valley Project. The Damodar Valley Corporation will execute and operate schemes for irrigation, the generation of power and flood control. The Corporation will also provide navigation, afforestation, public health and industrial, economic and the general well-being of the people of the Valley. The construction work has commenced.

The project envisages the construction of eight dams and a barrage. The dam sites will be located at *Maithon on the Barakar, Aiyar on the Damodar, one across the Konar, one across the Bokharo, Balpahari and Tilaiya on the Barakar and one near the Panchet Hill on the Damodar*. The barrage is to be located at Durgapur. The order in which the construction will be undertaken will depend much on the availability of plant, equipment and construction personnel. At present the Tilaiya dam will be built first followed by one on the Konar, one at Maithon and one at Panchet Hill.

The new hydro-electric power plants will supply 100,000 Kw and will complement the 150,000 Kwt. to be generated by Bokaro steam plant. Work has also started on the irrigation system ; it will include 1,550 miles of irrigation and drainage canals serving an area of one million acres in West Bengal. When fully developed, the irrigation system will help to give an additional production of 400,000 tons of food grains. The main irrigation canal will be 80 miles long and will connect Damodar river with the Hooghly river 30 miles upstream from Calcutta. The use of barges over the canal will relieve pressure on the railways and provide cheap means of transporting coal and other goods between the Valley and Calcutta.

The Hirakud Dam Project comprises the construction of a dam across the Mahanadi about nine miles upstream off the town of Sambalpur. There will be canals on either side and two hydro-electric installations. The Hirakud dam will be 150 feet above the river-bed with gross storage capacity of the reservoir 5.3 million acre feet. Two other dams will be constructed on the Mahanadi—one at Tikarpara and the other at Naraj, a few miles west of Cuttack. The three projects when completed, will

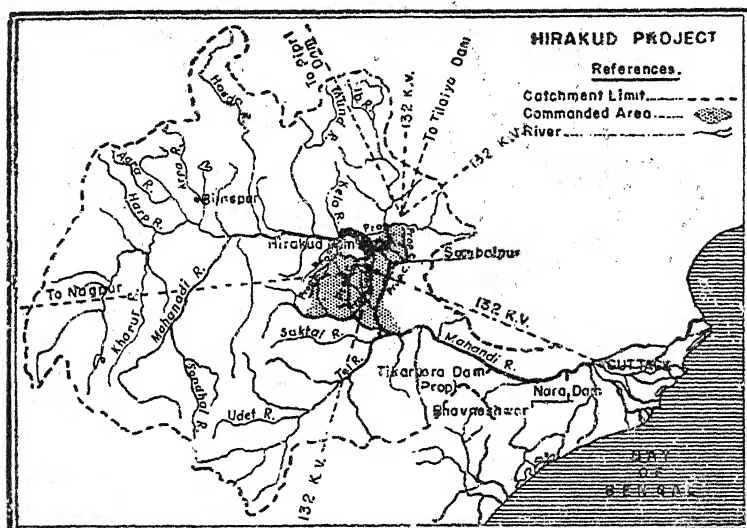


FIG. No. 40. Note the location of dams on the Mahanadi.

provide irrigation to 2,500,000 acres of land, generate 3,50,000 kw. and will also provide navigation facilities. The whole of the Mahanadi Valley, particularly Sambalpur district, Sonapur State and the delta region will be specially benefited by these schemes.

The Kosi Project is the most important scheme in Bihar. It will be a multi-purpose project for irrigation, power, navigation, flood control, silt control, soil conservation, drainage, reclamation of water-logged areas, malaria control, fish culture and recreation facilities. The project will comprise a dam about 750 feet high across the Chatra Gorge in Nepal to store about 11 million acre feet of water. There will be two barrages on the Kosi—(a) The first one in Nepal will control and stabilise the

river channel and will divert its supplies into two canals on either side. About a million acres of land in Nepal territory will

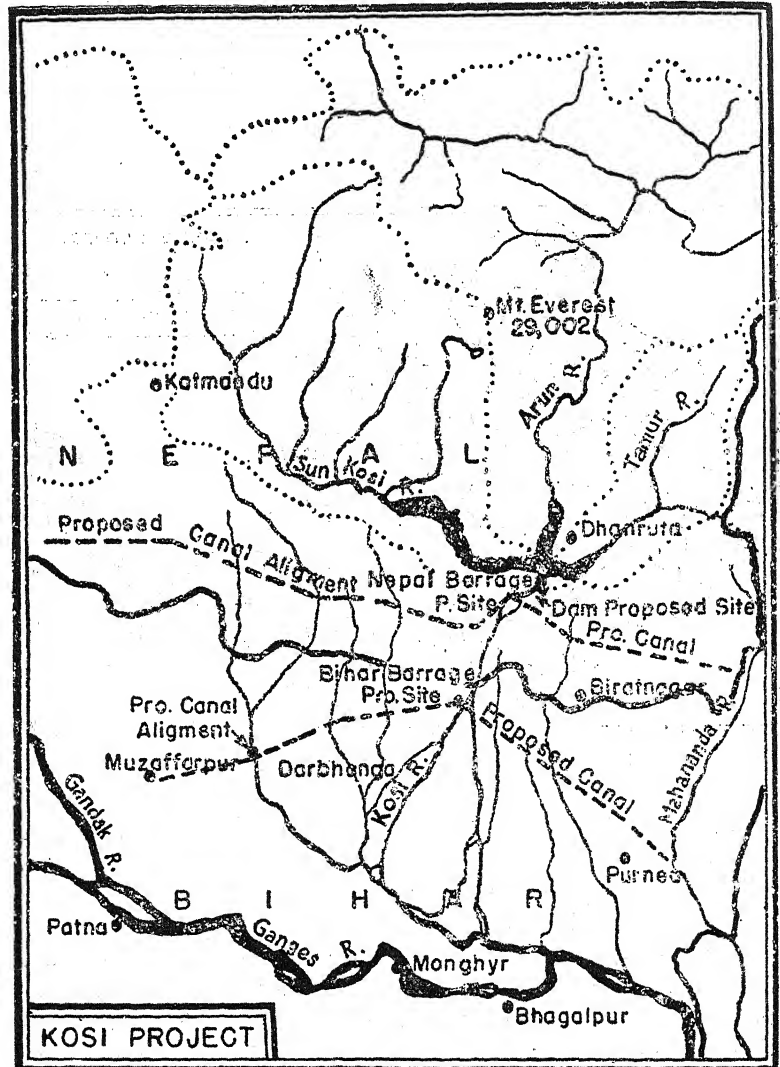


FIG. No. 41. The project will serve northern Bihar.

be irrigated by these two canals. (b) The second barrage will be near the Nepal-Bihar border, where two canals on the left and

one on the right will be constructed for irrigating over two million acres in the districts of Purnea, Darbhanga and Muzaffarpur in Bihar.

The power plant at the dam site will be capable of generating 1.8 million kw. of cheap power. The project may take ten years to complete and the cost is estimated at Rs. 90 crores.

The Tungabhadra Project comprises the construction of a dam 8200 feet long and 160 feet high across the Tungabhadra, a major tributary of the Krishna. The reservoir will contain 2.6 million acre feet of water and will serve Madras and Hyderabad. About 300,000 acres of land will be irrigated by the scheme. The Project will also develop a small quantity of hydro-electric power in Madras.

The Bhakra and Nangal Project* is the only multi-purpose scheme in East Punjab. The industrial development of East Punjab is at present very much retarded by the shortage of power. The state is without coal and petroleum fields. The remedy lies, therefore, in the development of hydro-electricity which will in turn facilitate agricultural production, through electrically-operated tube-wells to make the country self-sufficient. Fortunately for East Punjab there are great possibilities for such water-power development at Bhakra and Nangal on the Sutlej river. The essential feature of the Bhakra project is the construction of a cement and concrete dam, 689 ft. high, across the River Sutlej at the site of Bhakra Gorge, about 50 miles upstream of the present headworks of the Sirhind canal in East Punjab. The total storage capacity of the reservoir is estimated to be 7.2m cubic ft. of which nearly 5.5m cubic ft. will be available for hydro-electric power generation and irrigation purposes every year. According to the latest design, the reservoir level has been kept at 1,680 ft. above sea level. The dam would have an overall height of about 680 ft. and would rank as the highest straight gravity dam in the world.

* Though conceived in 1909, it was not until 1946 that the Bhakra-Nangal multi-purpose river valley project was undertaken. The intervening decades were marked by various excuses and a 4-year injunction on the Punjab Government obtained by Sind on the recommendation of the Indus Commission of 1941. The ban expired on October 1, 1945. Government had no further pretext to put off the scheme especially as the entire winter discharge of the five rivers had been utilised to the advantage, largely, of what is now West Punjab. Admittedly further irrigational development lay in the storage of the surplus monsoon water.

Stored water would provide irrigation facilities for nearly 6.6m acres of land and generate about 230,000 kilowatts of electric energy. An additional 170,000 kilowatts would be produced on the Nangal hydro-electric canal which forms a feeder channel for the Bhakra canal system.

The length of the dam at the top will be about 1,700 ft. and the width of the base at its widest point about 1,100 ft. A 30 ft. roadway will be provided at the top.

During construction of the dam the river will be diverted through two 50 ft.-diameter diversion tunnels, one on the right and the other on the left, going through hillsides. Each tunnel will be about a half-mile long.

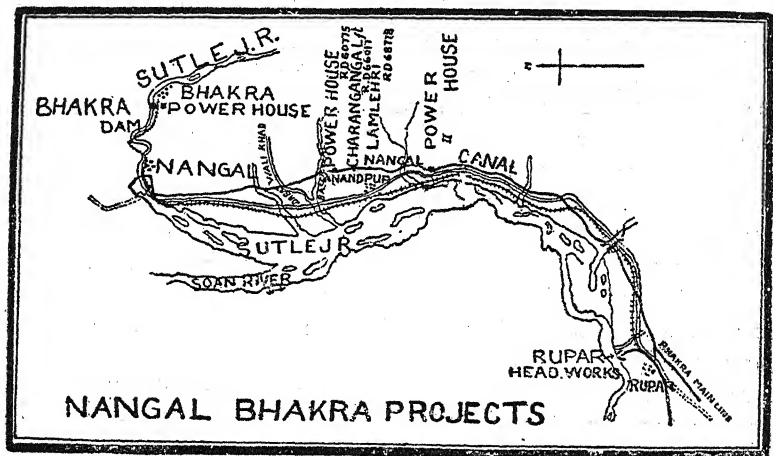


FIG. No. 42.

The Nangal scheme provides for an auxiliary dam or barrage across the river at Nangal, about eight miles down-stream from Bhakra, which will divert the river into the Nangal hydro-electric canal and at the same time serve as a balancing reservoir for taking up daily fluctuations from the Bhakra dam and for meeting daily and weekly load variations on power houses on the Nangal hydro-electric canal. The Nangal dam will be a massive concrete weir 1,029 ft. long, 400 ft. wide and with its deepest foundation going down to 50 ft. below the river bed. The waterway will consist of 28 bays 30 ft. wide, each provided with a steel gate

which will head up the water about 50 ft. above the existing river bed. The Nangal Hydel System will supply electric power to Rupar, Ambala, Karnal, Panipat, Hissar, Bhiwani, Rohtak, Nabha, Patiala, Ferozepur, Faridkot, Kalka, Kasauli, Simla, Jullundhar, Hoshiarpur, Kapurthala, Dhilwan and 49 other small cities. When Bhakra is completed, electric power will be extended to Delhi, Gurgaon, Palwal and Rewari.

The hydel power will also be used extensively for tube-well irrigation in several areas of East Punjab which are not served by canals. "Tube-wells will also serve to de-water the water-logged areas and supply this water elsewhere in dry areas." In course of time power will be used for railway electrification, especially on the main line between Delhi and Amritsar.

The concreting of the Bhakra dam started about the end of 1951 and will be continued over a period of about 53 months. The entire work including installations of pen-stocks, and outlets, trashracks, drum-gates and power units in the left power house is scheduled to be completed by March, 1955. This programme is based on the assumption that most of the plant and machinery will be received in time and supplies of essential materials like cement, steel, coal, fuel oil and petrol will be available as required.

The Rihand Valley Project is by far the most important multi-purpose scheme in Uttar Pradesh. The dam at Pipri, on the river Rihand which is a tributary of the Sone will be the largest reservoir in India. The dam will be over 3000 feet long, and the storage capacity of the reservoir will be 90 lakh acre feet. The surface area of the lake created will be 180 square miles.

The scheme will confer numerous benefits on the country. (a) The eastern parts of the State do not have any proper irrigation system and entirely depend upon rainfall for crops. The scheme shall enable the construction of 300 tube-wells and 4000 miles of pumped canals from the Gogra, Ganga and Jamuna rivers. Thus, large tracts of unbroken land will be cultivated for food production ; (b) fish culture will be possible in the huge lake ; (c) the canals will bring the unexplored region of the Sone valley in touch with the Ganges. Large cargo vessels will ply between the Hooghly and the Rihand ; (d) the industrialisation will take place in the wake of the Project. The region is one of the richest

in mineral wealth; (e) some sections of the railways can be electrified to save coal. The power raised from the water will result in the saving of 20,000 wagons of coal per year.

Other benefits of the scheme will be control of flood in the Rihand and the Sone, lesser soil erosion in the Rihand valley, better afforestation in Rewa and restoration of marginal lands. Thus it is an ambitious undertaking designed to pave the way for the agricultural and industrial advancement of the eastern parts of the State and is destined to become a landmark in the development of India.

QUESTIONS

1. Describe the various methods of irrigation in India. Indicate the region where each is practised. (Cal. Inter., 1940, '37, '34).
2. What do you understand by the term "multipurpose project"? Also discuss fully the benefits likely to be derived when Damodar Valley project will be completed. (Delhi B.A. Hons., 1950; Cal. B.Com., 1949).
3. What do you know about the Damodar Valley Project? State the economic advantages Bengal and Bihar are likely to derive from it when the project materialises. (Cal. B.Com., 1947).
4. What are the principal multi-purpose project in Indian Union? Describe any one of them from the point of view of areas and possible benefits.
5. "The canal-irrigation has developed much in the United provinces." Explain.
6. Discuss the resources of India for development of hydro-electric projects. Do you think it would be wise to develop such projects in the regions possessing coal?
7. Describe two major irrigation schemes under construction in India. Why is irrigation so essential there?
8. What do you know of the Bhakra-Nangal multi-purpose project? Discuss the economic advantages which East Punjab and Delhi are likely to derive from it when the project materialises. (Delhi B.A. Hons., 1951)

CHAPTER V

FORESTS AND THEIR PRODUCTS

Forests play a vital part in maintaining sound national economy. Their potentialities in developing industries are great.

India is very rich in forests which cover more than one-sixth of the total area of the country. Throughout this vast forest area there is a variety in the types of forest vegetations, depending on variations of climate and soil and on the other local factors.

About 50 per cent. of the forest areas are in the Peninsular Hill and plateau region. Excluding Kashmir and Jammu, only about one-sixth of India's forests is in the Himalayan region.

GEOGRAPHICAL DISTRIBUTION OF FOREST AREAS

State	Forest area in square miles (1948-49)	State	Forest area in square miles (1948-49)
Assam ..	20,929	Kashmir ...	11,058
Bihar ..	2,473	Mysore ..	4,448
Bombay	15,347	Pepsu	332
Madhya Pradesh	19,414	Rajasthan	12,782
Madras	17,504	Saurashtra	631
Orissa	2,874	Travancore-Cochin	3,065
Punjab	4,873	Total 'C' States	19,303
Uttar Pradesh	10,743	Andaman ...	2,189
West Bengal	2,680		
Hyderabad	9,455		160,104

Thus, the Indian Union has under forests about 25 per cent. of the total land area. About 12 p.c. of the total area may be classified as merchantable forest.

Broadly speaking, there are five types of forests in the Indian Union.

(1) Arid country forests, extending over a considerable portion of Rajputana and the south of the Punjab. The most important tree is the babul.

(2) Deciduous forests extend over large areas in the sub-Himalayan tract, and in the Peninsular India. Sal, teak sandal,

ebony, rose wood, Indian Paduak and great variety of other valuable trees are found in these areas.

(3) Evergreen forests occur in those areas where the rainfall is heavy. Such regions are the west coast of the Peninsula, the

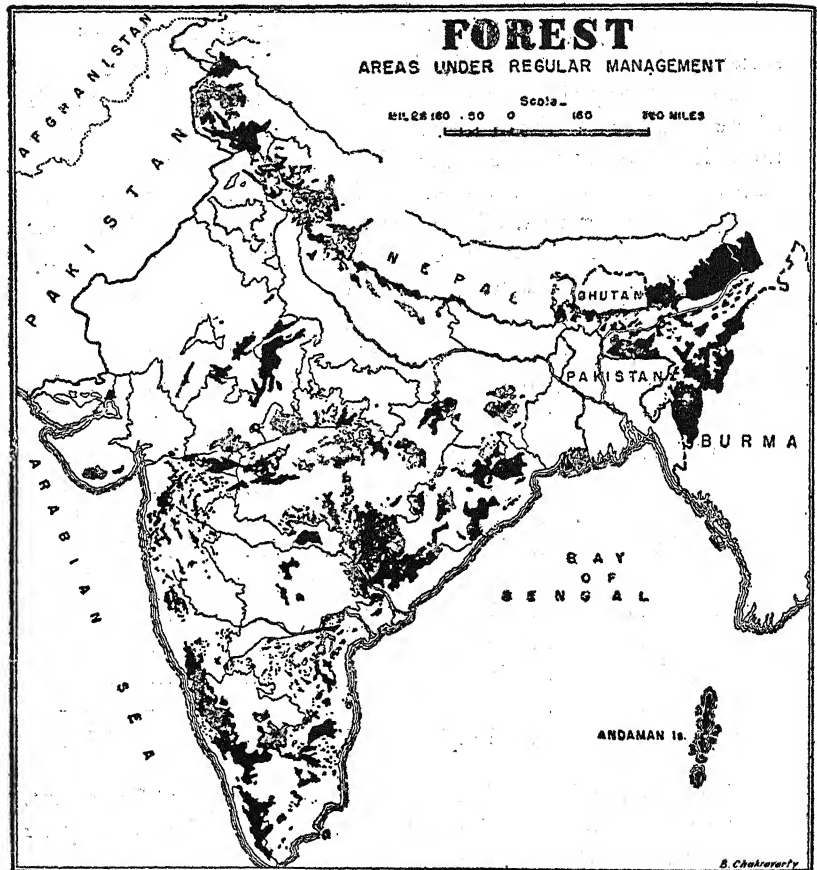


FIG. No. 43. There is no proper balance between agricultural and forest lands in India. While Coorg, Madras and Madhya Pradesh have sufficient forest areas, most of the other areas have much less than the minimum required for proper land use.

Eastern sub-Himalayan tract and the Andamans. The trees are bamboo, palm, fern and Indian rubber.

(4) Hill forests. They vary according to elevation between 3,000 feet and 12,000 feet. The sequence of species is oak, cypress, cedars, firs, spruce, birch and junipers. In the Eastern Himalayas and Assam the forests are full of oak and magnolia. In Assam pine trees grow abundantly at an elevation of 3,000 to 6,000 ft. Deodar, pine and oak occur in the North-Western Hamalayas.



FIG. No. 44. The area under dense scrub covers about 80 million acres in India.

(5) Littoral forests occur on the northern sea coasts of Madras and along tidal creeks of the Sundarbans in Bengal. The most characteristic trees belong to the mangrove family.

Indian forests provide employment to a large number of people such as wood-cutters, sawyers, carters, carriers and raftsmen.

Indian forests play an important part as suppliers of raw-materials for various industries. The forest produce is divided into two main heads: (1) major produce, *i.e.*, timber and firewood and (2) minor produce, *i.e.*, comprising all other products such as lac, tanning materials, essential oils, turpentine and resin. Paper industry is dependent on bamboos for the manufacture of paper pulp. Match-making industry also depends on the forest produce.

Forests are replaceable, but at a slow rate. So the use of forests as a source of fuel is not desirable. Forests should be reserved for other and more profitable purposes. "Wood should be altogether left out as a source of power supply, whether as an alternative or as a supplement to coal or electrical energy."

The annual production of timber in India is 220 million cubic feet. Important timbers include deodar, sal, rose-wood, paduak, Indian mahogany and teak.

India exports firewood, hardwood, Sandalwood, and Teak to Hongkong, U.S.A. and other countries. In 1952-53, India exported wood and timber to the extent of 2,582 cubic tons.

Lac is secreted by a type of insects which feed on the saps of certain trees. These trees are palas, peepul and kōsum, and are found in the south eastern districts of Bihar, the western border areas of West Bengal, and adjoining districts of Bihar, Uttar Pradesh and Vindhya Pradesh, Madhya Pradesh, Orissa and Assam. Assam also produces a small quantity of lac. Chotanagpur in Bihar raises 60 p.c. of India's total. Only 2 p.c. of the production is consumed in India, and the rest is sent outside.

THE USE OF LAC IN INDIA

Gramophone Record	..	... 35 p.c.
Polish and Varnish	...	... 20 "
Electrical Insulation	...	... 15 "
Hat Stiffening	..	... 10 "
Ceiling Wax	...	... 5 "
Lithographic Ink and others	..	... 15 "

Lac is manufactured into shellac in Uttar Pradesh, Bihar and West Bengal in several small factories. Mirzapur in

U.P. and Pakur in Bihar are two important centres for shellac manufacture.

India enjoys a practical monopoly of lac trade. Total amount of lac used in India is small and most of the product is exported. Best customers of Indian lac are the U.S.A. and the U.K. About 98 p.c. of the total lac export is handled by Calcutta. In 1952-53, the Indian Republic exported 700,000 cwts. of lac.

A serious problem in connection with lac trade is the question of adulteration. Very often Indian exported shellac has been found to contain resin even upto 30 per cent. of the quantity. In some cases molasses and powdered clay are mixed with lack. To safeguard the interests of the lac trade, it is desirable to stop such malpractices.

Resin is derived from the pines of the Himalayas and Assam hills and is worked for making resin and turpentine oil. Resin is used for shellac adulteration, in paper mills, soap factories etc., while turpentine has demand for medicine and varnish.

Myrobalans grow in abundance in Madras, Bombay, West Bengal, Chotanagpur, Orissa and other places. A variety is found in Coimbatore whose fruits are very small in size, but the tree is taller than the *pipul* tree of our country. The fruit, the bark, the leaves, the trunk—every part of the myrobalans has some use or other for us. The timber is very strong. The Jubbulpore myrobalan is the best of all and is used for the preparation of medicine and dyes. *Myrobalan is a great toner in tanning*. The alkali of myrobalans is useful for preparing different dyes by mixing various ingredients. In Madras, myrobalans are extensively used for dyeing cotton, wool and skin. In Assam, *endi* and *Muga* silk are dyed with myrobalan alkali. England, Germany, Belgium, China, Japan, the U.S.A. and Australia are the chief importers of Indian myrobalans.

In recent years, the forest products have assumed great importance as raw materials for medicinal and perfumery purposes. Sandal wood oil, palmarosa (from Rosha grass), linalol, and vertivert are important essential oils. Margosa (Neem) oil is regarded in India as a specific for skin diseases and is used in soaps. Drug-plants are also exploited in India and these include *Atropa*, *Belladonna*, *Hyoscyamus*, *Podophyllum*, *emodi*, *Nux Vomica*,

and *Artemisia Previifolia*. Other drugs include Aconite, Mentha, Juniper etc.

The Forest Research Institute at Dehra Dun is engaged in (a) finding out suitable woods for aircraft construction, (b) producing cheap printing paper, (c) discovering indigenous woods suitable for use as battery separators etc. and investigating on pencil wood. A systematic investigation on pencil woods has shown that not only is Indian deodar suitable for first-class pencils, but is also superior to the East African deodar, on which the Indian pencil industry largely depends at present.

The question of *bringing timber and other materials from forests to the road, railway or river that leads to the place of utilisation*, is the main problem of the forest industry. At present two methods are applied: (i) employment of bullocks, buffaloes and elephants as carriers of forest produce, and (ii) timber rafts are floated down the rivers during monsoon months to be dragged again from the water (after, of course, many days of floating) at the saw mills.

Some important commercial timbers

BAING (*Tetrameles nudiflora*) from Assam is a white soft wood.

BENTEAK from the West coast is a reddish brown moderately hard wood and has considerable demand for furniture, coffee cases, ship-building etc.

BIJASAL obtainable in Bombay, Madras and Bihar is a very hard, close-grained durable wood and is used for door and window frames, furniture and agricultural implements.

BLUE PINE (*Pinas excelsa*) from the East Punjab is much used in constructional work.

DEODAR (*Cedrus Deodara*) is a moderately hard wood, strongly scented and oily and is used for railway sleepers and in building.

DHUPA found along the foot of the Western Ghats, besides giving the gum resin, is used for tea chests and packing cases.

HALDU (*Adina cardifolia*) is found all over India. It is a yellow, moderately hard, even-grained wood and is used for furniture and cigar box making.

INDIAN ROSE WOOD is world famous and is found mostly in the forests of the southern part of the Western Ghats. It is also

available in M.P. and Orissa. Extremely hard and close-grained, this dark purple wood is the highest priced timber in India and is widely used for furniture making.

SHISHAM otherwise known as *Sisso* is available in Uttar Pradesh, East Punjab and West Bengal. This wood is very hard, close-grained and brown in colour and takes a high polish. It is much used for carriage, cart and boat-building all over the Northern India.

IRUL WOOD and MESUA (*Mesua ferra*) are found in Madras. Being very durable, they make excellent railway sleepers. Mesua is also available in Assam.

SAL (*Shorea robusta*) is in regular demand in Northern India for building piles, beams, planking, door and window posts and for railway sleepers. This timber is available in Assam, West Bengal, Bihar, Madhya Pradesh, Orissa and the Uttar Pradesh.

SANDALWOOD comes from the dry regions of South India and is hard, close-grained, yellowish brown wood, strongly scented by the oil characteristic of the tree. It is in demand for making boxes and small articles, often beautifully carved. The oil of the wood is also important.

SEMUL (*Bombax Malabaricum*) is found widely in Assam, Bihar and Madras. The timber is soft and white and is used for toys, packing cases and planking.

SUNDRI (*Heriteira Species*), available in West Bengal, is used for boat-building, furniture, beams, planking and posts. The wood is very tough and hard.

TEAK (*Tectonia Grandis*) is extensively found in Madhya Pradesh, Madras and Bombay. As a ship-building wood and as a good wood for house carpentry, it has long been known in many parts of the world. In India it is a general purpose timber for house and ship-building, bridges, railway sleepers, furniture etc.

The timber experts believe that preserved and treated wood and pressurised bamboo could replace steel in a variety of ways. India has a wide variety of timber and a large surplus of bamboo in the forests.

This timber-for-steel scheme, if successful, may solve the steel problem which is retarding industrial development not only in India but in other Asian countries, e.g., in Central and South Asia.

QUESTIONS

1. On a sketch map of India, show the regions with important timber resources. How are these utilised at present? Discuss the projects of increasing exports of Indian timber to the world's markets. (B Com., 1941).
2. Discuss the position of India as a supplier of timber in the world markets. How, in your opinion, can the export of this commodity be improved to the European markets, and which of the Indian timber offers the best possibility? (B.Com., 1938).
3. What are India's most important forests? Give instances of the use to which Indian forest products are at present put and discuss their future possibilities. (B.Com., 1931; Inter., 1931).
4. What do you understand by the term "afforestation"? State the regions of India that are best suited for this purpose.
5. Is India rich in forest products? Mention the regions where these are available and their principal uses. (Cal. Inter., 1946).

CHAPTER VI

LIVESTOCK AND THEIR PRODUCTS

Though of poor quality, a large number of livestock is maintained in India.

NUMBER OF LIVESTOCK POPULATION IN INDIAN UNION

(In million)							
Cows	..	..	61	Horses	..	...	1.5
Buffaloes	.	..	28	Mules	...	...	1.5
Sheep	.	..	40	Camels	.	...	.9
Goats	...	..	50				

The world's cattle population, according to a recent estimate, comes to about 690 million animals. Cattle in *India* are estimated at 137 million. Thus India leads the world in cattle population. Cattle are used for ploughing and for milk. "Without them the fields remain unpopulated, store and bin stand empty, and food and drink lose half their savour, for in a vegetarian country what can be worse than to have no milk, butter or ghee?" The cattle in India, however, are ill-fed and irregularly distributed. In many parts of India, sufficient grass is not grown, and therefore, it is necessary to raise fodder crops. In Northern India, due to the overwhelming importance of agriculture almost every cultivable land is occupied and thus grazing grounds are few in number. The important cattle-breeding areas are the northern Gujrat, Madhya Bharat, Nellore district, the U.P., Mysore and Bombay.*

It is estimated that not less than 40 million sheep are kept in India. Sheep industry is in the hands of people who are ignorant of the trend of modern development. Sheep in India are reared particularly in the Hissar district of the Punjab; Garhwal, Almora and Nainital in the U.P.; Kathiawar, Gujrat, Mysore; and the Bellary, Kurnool and Coimbatore districts of Madras. The Indian sheep is inferior to that of Australia or South Africa as mutton

* Pedigree cattle of Indian breeds are Sahiwal (Delhi, Ferozepore, Nagpur), Haryana (Karnal and Hissar), Gir (Bombay and Bangalore), Kankring (Baroda), and Rangyam (Madras), Nagori (Rajasthan).

or wool producer. The wool of Northern India is white and of fair quality while in the Peninsular India, it is grey, short and coarse. The average annual production is little above 55 million lbs. "A good deal of the wool, which comes into the Indian market is dead wool, *i.e.*, what has been removed from the carcasses of slaughtered sheep and not shorn."

PRODUCTION OF WOOL

Area	Production (million lbs.)
Jodhpur	8
Bikanir	5.7
Uttar Pradesh	5.2
Madras	4.5
East Punjab	4.3
Hyderabad	4.2
Jaipur	3.5

The wool production in India is largely consumed for village handicraft and manufacture of coarse blankets although a small portion is exported. The average annual export of raw wool is about 42 million lbs. A frequent complaint of the foreign consumers about Indian wool is the presence of excessive foreign matter such as sand, burrs etc. It is, therefore, desirable that wool should be properly washed and graded before export.

Goats may be considered as the poor man's cheap milk animal. Goat's milk is highly valued for human consumption, but the yield of milk from goats is very small. There are over 50 million goats in India. These animals are valued for their meat and milk and in places for their hair. Goats are very prolific and they are easily domesticated. Mules and horses are used in India mostly for drawing carts. There are 3 million such animals in India and these are found chiefly in the Punjab, U.P. and Bombay. Camels are mostly confined to the East Punjab and Western Rajputana. In these areas camels are largely used for ploughing and as draught animals.

Animal products in India are hides and skins, bone, wool, milk, butter and ghee. Hides and skins are used for making harnesses, bags, suitcases, trunks, machine belts, automobile tops and sets, cases for guns, shoes and gloves. The term hide denotes the skins of cattle, horses and camels while the term skin is

restricted to those of calves, sheep and goats. In India, the hides and skins are mostly collected from the slaughter-houses. West Bengal and Madras are the largest producers of cattle hides, Madras the largest producer of buffalo hides and sheepskins, and the Uttar Pradesh the largest producer of goatskins, followed by West Bengal and Bihar. The leather centres in India are Kanpur, Agra, Calcutta, Delhi and Madras.

INDIAN UNION'S ANNUAL PRODUCTION OF HIDES AND SKINS

Buffalo hides	.	52 lakh pieces
Cow hides	165	" "
Goatskins	297	" "
Sheepskins	118	" "

Indian hides and skins are purchased by the U.S.A., Germany, U.K., France, Belgium, Iraq, Iran and Burma. In 1948-49, the Republic of India exported 15,941 tons of raw hides and skins. In undivided India, the export figure was 30,000 tons. India's capacity to export hides has become limited because of partition.

The yield of milk per cattle is very erratic ranging between 5 to 17 lbs. per day. With a little attention, this can be raised to 15 lbs. per day for most of the milch cattle. "Compared with other countries India stands second in the volume of milk production, her output being exceeded only by the U.S.A. She produces over four times the output of Great Britain, over five times that of Denmark, over six times that of Australia and over seven times that of New Zealand."*

ESTIMATED TOTAL PRODUCTION OF MILK IN THE IMPORTANT PROVINCES

Madhya Pradesh	.	...	82·5
U. P.	...	...	1101·5
Bihar	...	...	559·18
Orissa	...	...	48·89
Assam	...	...	27·8
Bombay	...	...	182·66
Madras	...	...	465·19

* *Report on the Development of the Cattle and Dairy Industries of India* by N. Right.

The *per capita* production is hardly 8 ounces in India, being the lowest in the world.* India's problem of milk shortage can, however, be overcome by paying more attention to buffaloes. Cows cannot be as economically developed as buffaloes considering their return in milk. Buffalo stock in India can be improved by better feeding. The cattle of India require more fodder than they are getting now. This is a factor which makes it impossible for imported European breed of cattle to survive in this country. Besides, a number of useless cattle in India consume a large portion of India's already meagre available fodder.

The two important products of milk are butter and ghee. *The production of butter from milk has increased in recent years with the development of dairy farming.* The centres of this industry are Agra, Aligarh, Bombay and Calcutta. Practically the entire production is consumed in the country.

The dairy development activities in India are being pursued with vigour in a number of places. The state of Bombay has made remarkable progress in dairying. At Anand and Kaira district (266 miles north of Bombay) a large butter factory has been started with a capacity of 10,000 lbs. of butter a day. Its butter is sold throughout India. The Anand area also supplies 5,000 gallons of milk per day to Bombay city.† In Madras, a fairly modern milk pasteurising plant has been set up at Oatacomund. In U.P. there are dairies at Aligarh, Kanpur, Lucknow, Banaras and Allahabad.

Ghee has considerable demand in India and is "prepared by practically every household by heating butter over a slow fire until an oil is formed that rises to the surface while the refuse settles down as sediment." Ghee is used in the preparation of food and sweetmeats. Buffalo butter gives greater yield of ghee than that of cow. The ghee-producing areas are the U. P., Rajputana, Madhaya Bharat and the East Punjab. The annual production of ghee in India is about 14 million maunds.

* The average consumption of milk per head per day ranges from 13 ounces in Assam to 16 ounces in East Punjab.

† The Bombay Government has acquired approximately 3,000 acres of land some 20 miles north of Bombay and is building there a model dairy colony which will accommodate approximately 15,000 milch cattle. The colony will also have a central dairy with a large pasteurising plant of a capacity of 4,000 gallons a day.

The seasonal variation in the quality of ghee is always noticeable. The best ghee is produced during the winter while the ghee produced in the rainy season is of inferior quality. Cheaper and inferior fats are often mixed with ghee.

Of the total ghee production, nearly 30 per cent. is retained by the producers for domestic consumption and the rest is marketed. Ghee is also sent to the Straits Settlements, Malaya States, Ceylon, South Africa, Mauritius and Hong-Kong where a large number of Indian emigrants have settled. India also imports in normal years about 66,000 maunds of ghee, mostly from Nepal.

Recently the ghee trade has suffered greatly by the competition of vegetable oils. The establishment of ghee-grading centres is necessary for getting ghee graded and tested for purity.

Poultry. The importance of poultry in India may be judged from the fact that, domestic consumption apart, it is estimated that 60 per cent. of hen-eggs and 80 per cent. of duck-eggs are sold every year to the value of over Rs. 5 crores, the value of birds themselves being estimated at Rs. 7½ crores. The per capita consumption of eggs per annum is 296 in Canada, 154 in Great Britain and 8 in India. This is because the people in India are vegetarians. India exports dried and liquid eggs outside.

CHAPTER VII

THE FISHERIES

The importance of fishing lies in the immense potentiality of that article in the food resources of this country. Notwithstanding the prevalence of vegetarianism, a large number of every caste and creed in India are accustomed to use fish in their daily diet.* Of the total population, only about 32 millions of people consisting of Brahmins, Vaisyas and Jains do not take fish or meat because of religious injunctions. In many cases among the non-vegetarians, the preference for vegetarian diet is because of non-availability of fish or its high price. Thus as a source of food, fisheries stand almost equal to agriculture and animal husbandry.

The chief sources of supply are the coastal margins of the sea, river estuaries, and backwaters for marine and estuarine fish, and rivers, canals, tanks, inundated tracts etc. for fresh water fish.

The maritime and riverine fisheries at present occupy a very minor place in the national economy of India.

The fishing areas of India may be divided as follows:—(a) Sea fisheries, (b) Deltaic fisheries and (c) River fisheries.†

At present, the sea fishing is carried on within 10 fathoms in the sea. For the rational utilization of the sea, it is necessary to ascertain the behaviour of the water by studying all the three aspects of oceanography—physical, chemical and biological. So far very little is known about the characteristics of the Coastal waters of India. For the establishment of large scale fishery industry, India requires modern marine research for assessing the productivity of her waters.

* National Planning Committee—Fisheries.

† The fisheries of India may also be divided into two main classes: (1) Inland Fisheries, and (2) Marine Fisheries. The inland fisheries can further be divided into fresh water and estuarine, while the marine fisheries may similarly be considered under the heads: fore-shore and off-shore fisheries and the deep-sea fisheries.

ESTIMATED PRODUCTION OF SEA FISH IN INDIAN UNION*

Areas		Total catch (000 mds.)	P.c. to total
Kathiawar	...	99.8	0.99
<i>Bombay :</i>			
Gujrat	..	107.7	1.07
North Thana Zone	.	163.9	1.63
South Thana Zone	.	380.6	3.78
Ratnagiri Coast	..	354.3	3.52
North Canara Coast	..	490.9	4.90
<i>Madras :</i>			
West Coast—			
South Canara Coast	..	1604.0	15.92
Malabar Coast	...	2266.6	22.49
East Coast—			
Southern Section	.	182.4	1.81
Central Section	..	270.4	2.67
Northern Section	...	456.7	5.41
Cochin	.	308.4	3.06
Travancore	..	2423.0	24.03
Orissa Coast	..	303.3	3.0
Bengal Coast	.	577.2	5.7

Of the total production of fish in India, about 71 per cent. come from the sea.

Indian Union has a coast line of 2920 miles exclusive of indentations and the total area of the sea which lies between the coast and 100 fathoms line is approximately 110,000 square miles. Only a small portion of this area is worked. The sea-fisheries are confined to the coastal waters from the shore in Gujrat, Canara, Malabar Coast, Gulf of Mannar, Madras Coast and the Coromondal Coast. All major marine fisheries are confined to comparatively shallow waters over narrow belts of continental shelves and slopes. In these areas also the good fishing grounds occupy only a fraction of the entire belts between the coast lines and the continental slopes. The greater depths beyond the 100 fathom line are almost barren from the standpoint of commercial fisheries. The unsuitability of the vessels, limitation due to climate, absence

* Report on marketing in Fish in Indian Union (Government of India publication, 1951).

of suitable harbours and the lack of refrigeration, transport and marketing facilities are serious handicaps in the way of the development of the marine fisheries of India. Most varieties of fish caught along the coasts are edible. The principal catches are herrings, mackerel, prawns, Jew fish, cat-fish, mullets, pomfrets and Indian salmon. Mackerel accounts for over a third of the total catch and is found chiefly in the west coast of Madras, Travancore coast and Bombay coast. Herrings account for over 15 per cent. of the total catch. Prawns occupy the third rank with 9 per cent. Pomfrets, mullets and the Indian salmon, although very popular, are caught only in comparatively small quantities, the respective percentages being 1·7, 1·9 and 1·3. The type of fishing implements includes drift nets, cast nets, stationary nets, etc. In the sea, fishermen catch fish very near the shore and do not go beyond a distance of 5 to 7 miles.

The Deltaic fisheries are confined to the estuaries, backwater areas, lagoons etc. and generally constitute very rich potential fisheries. While the fisheries in some areas, such as the Chilka Lake in Orissa, backwaters in Madras, Cochin and Travancore, are extensively exploited, those on the extensive deltaic area of the Sundarbans and the delta of the Mahanadi are hardly tapped. The backwaters of Travancore-Cochin covering about 300 square miles offer excellent grounds for development of estuarine fish-farming for rapid-growing species of mullets, bekti, pearl spot etc.

The estuaries of the Mahanadi, the Ganges and the Brahmaputra stretching from Puri to Hooghly contain cock-up, hilsa, pomfrets, prawns, catla, cat-fishes, rohu, etc., which are caught by trawl-type nets, drift nets and gilling nets, casting nets, bag nets, etc.

The river fisheries at present constitute the mainstay of inland fisheries of Indian Republic and are carried out in rivers, canals, irrigation channels, tanks, ponds, etc. The extensive expanses of the Gangetic system in the U.P., Bihar and West Bengal, the Brahmaputra in Assam, the Mahanadi in Orissa, the Narmada, the Tapi, the Godavari, the Kistna and the Cauvery systems in Madhya Bharat are the main areas. Fishing in the Ganges system is very important. In these parts, people always prefer freshwater fish. The actual yield of freshwater fisheries cannot be estimated. *The estimated marketable surplus in the country is in the neighbourhood of 4 million maunds of fish.* Nearly 95 per

cent. of the available freshwater fish is marketed in the provinces and only 5 per cent. in the acceding states. Among the provinces West Bengal leads both in availability of fish as well as in value with 29 per cent. and 36 per cent. respectively. Bihar is a close second and Assam is the third in regard to the available surplus and the three provinces of West Bengal, Bihar and Assam account

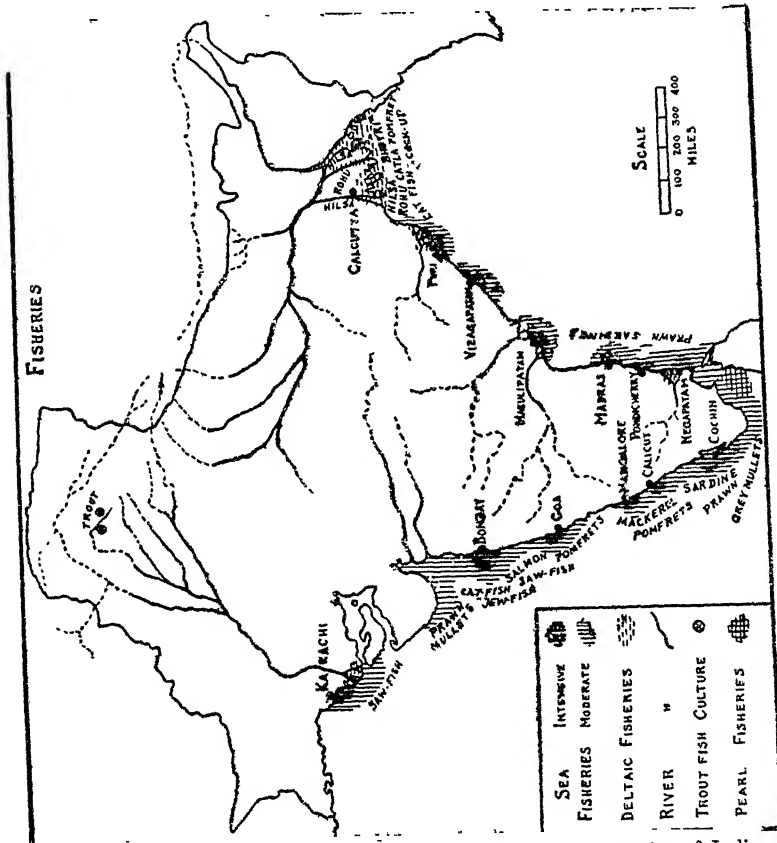


FIG. No. 45. Map showing the areas of sea and riverine fisheries of India. Note a continuous fishing belt from the Coast of Kathiawar to the Bay of Bengal.

for nearly 72 per cent. of the total freshwater fish marketed in the Indian Union. Madras, the leading province in the production of sea fish, catches only 4·7 per cent. of the Indian total so far as freshwater fish are concerned. The Mahanadi in Orissa and the

Ganges and its tributaries in U. P. yield 8·3 and 3·8 per cent. respectively of the Indian total.

The great problem that lies in the way of developing fishing industry in India is that people are greatly accustomed to the consumption of certain varieties of fish and these only. Wide publicity and propaganda are necessary to enlighten the people as regards the nutritious value of fish not consumed at present.

The average *per capita* consumption of fish in India is 3 lbs. per annum, West Bengal being the leading consumer having 6 lbs. per capita consumption. In the East Punjab, it is 0·9 lbs. and in Bihar, 2 lbs.

One-half of the total production is consumed as fresh fish: one-fifth is cured by salting, another one-fifth is simply sun-dried, while about 10 per cent. is converted into fish fertilizers.

Present position in Madras, Bombay and Bengal: Madras with a coastline of 1,750 miles makes a fishing ground in the shallow water area of 40,000 square miles. The fishing population is very large, but the methods are very primitive. Drifters and trawlers are never used. Country boats are engaged in catching sardine, mackerel, Jew fish, ribbon fish, etc., in the shallow waters around Ganjam, Gopalpur, Vizagapatam, Cocanada, Masulipattam, Nellore, Madras, Pondicherry and Nagapatam on the east coast and Calicut and Bangalore on the west coast. Deep-sea fisheries are practically absent in Madras.

Fish is considered an important item in food for daily use in Bengal, and many people depend on fishing industry in the Presidency Division. But fishing is confined to inland waters; the sea fisheries are as yet little exploited. If proper attempts are made, the Bay of Bengal can yield large quantities of highclass fish. In 1950, the West Bengal Government had invited Danish experts to train Indian crews and for investigating the possibilities of trawling in the northern waters of Bay of Bengal. As a result, a beginning in sea fishing in Bengal has been made. Another easy way of getting fish in West Bengal is to grow fish in ponds. There are many ponds in the province. The people can grow fish, particularly Rohu and Mrigel which can be fed in a pond like poultry in a yard. The fish are fed on boiled rice, potatoes, house-refuse and so on.

In Bombay, fisheries are concerned almost entirely with the exploitation of the wealth of the sea. "Bombay is favoured with

a coastline abounding with excellent harbours for fishing craft, a fair weather season lasting for some seven months, and a fishing population more alive to their opportunities and more daring than those of the sister presidencies."

Bhopal has a great scope for the development of fisheries. *Bhopal's three main rivers—the Narbada, the Baitwa, and the Parvati, with their tributaries, constitute the chief sources of fish. Also there are a large number of perennial and semi-perennial tanks, which can be utilized for raising fish.*

There is practically no fish-canning in India. The demand for canned fish is small and is met by imports. Difficulties for developing this industry are the absence of regular supplies of fish, lack of good and cheap containers and the short canning season. In India, fish is preserved by desiccation with or without salt and by the use of antiseptic preservatives such as brine, vinegar, etc. The fishermen in India practise desiccation by drying fish in the sun as the process is simple and handy. During the monsoon when sun-drying is difficult, salt is used. *Canning** is the best method applied for preserving sardines, mackerel and prawns and is practised on a limited scale in Madras and Bombay.

In order to develop the fishing industry in India, it is necessary to make, first of all, provision for cold storage facilities in every fishing port. Several Provincial Governments have undertaken surveys of the fishing grounds to ascertain what kinds and quantities of fish are available, and to find out how best these can be exploited.† The Government of India proposes to set up a chain of well-equipped pilot fishing stations along the coast of

* The fish are beheaded and thoroughly washed after which these are put in saturated brine and then dried. In the last stage, these fish are packed in cans filled with oil.

† The low socio-economic status of Indian fishermen and the lack of capital are providing India with a serious problem in attempting to enlarge and modernise the fishing industry, says Mr. H. Srinivasa Rao, Chief Research Officer of the Madras Central Marine Fisheries Research Station, in a report on Indian fishery at the first United Nations Scientific Conference on the conservation of resources (1949).

He says, "The utilisation of suitable brackish water ponds on our coasts for the culture of fish would appear to be within the collective financial resources of our fishing villages aided by our provincial and State Governments. If at least a fourth of the area of coastal salt water pools or ponds is suitably prepared and made available for fish culture, the cost would work out to half a crore of rupees. The socio-economic position of the fishermen and the lack of adequate facilities for transport and marketing, and the present financial situation in the country make it extremely unlikely that the exploitation process can be quickened appreciably in near future."

India. To begin with, stations will be located at Bombay, Cochin, Vizagapatam, Chandbali and Calcutta. Each station will have a cold storage plant with a capacity of 500 tons and refrigeratory motor vans for carrying fish to inland market by road.

The Governments of the seaboard provinces have decided to encourage the formation of co-operative societies for the marketing and distribution of fish.

Certain industrial products are also obtained from fish in India. These are fish-oil, fish-meal, fish-manure, fish-maws and shark-fins.

Commercially, very valuable fishing consists of pearl fishing. There are two types of oysters which are sought after: the *window-pane* oyster whose shell is used for decorative purposes, and the true pearl oysters. Window-pane oysters are found in the open sea off the Coromondal coast, Madras coast and Cochin coast. The waters of the gulf dividing Indian Union from Ceylon and of the Arabian Sea near the edge of the Kathiawar peninsula, as well as in the Gulf of Cutch, are rich in oyster beds, yielding highly valuable pearls. Unlike the Japanese oysters which are found in shallow waters in sheltered bays, the Indian variety thrives in the deep sea and has so far failed to acclimatize itself to a shallow water existence.

Certain maritime provinces and States have built up an export trade in preserved fish to Ceylon, Burma and countries in the Far East. The export depends, to a certain extent, upon the nature of the fishing season along the south-west coast of India, a favourable season resulting in an increased exportable surplus.

Madras, Travancore and Cochin are the chief exporting areas. In 1952-53, the volume of fish exported from India was 500,000 cwt. valued at Rs. 378 lakhs. Ceylon is the principal buyer, the average of her share being 80 per cent.

There is practically no import of raw fish into India, imports of fresh European or Canadian fish brought in cold storage in ships being negligible. But considerable quantities of preserved

"The initial difficulties of securing trained personnel and a minimum of suitable equipment have been partially overcome. Our main aim at present is exploitation on a large scale firstly to provide the much needed food to our starving masses, and secondly to utilise the opportunities thus created for estimating our fishing resources and for studying the physical and biological environments which support our fisheries."

fish are imported. The value of imported product is only Rs. 16 3 lakhs.

Research on fisheries is carried out at the Inland Fisheries Research Station at Barrackpore, the Central Marine Research Station at Mandapam and Deep Sea fishing station at Bombay

QUESTIONS

1. Examine the present position and the future prospects of the fishing industry in Bengal.
2. What are the chief areas in India where fisheries are carried on? Indicate the areas in a sketch map.
3. State the conditions necessary for the development of the fishing industry and the provinces in our country which possess such facilities. (Cal. I.Com., 1948).
4. What are the conditions for the development of fishing industry? Do you think that West Bengal possesses such facilities? Make concrete proposals for developing fish-supply in West Bengal. (W. B. C. S., 1949).
5. What are the prospects of fishing industry in Assam?
6. Examine the present position, and the future prospects of fishing industry in West Bengal.

CHAPTER VIII

MINERAL RESOURCES

Nature has been very kind to India in the endowment of mineral resources. In recent years, much progress has been made in the survey of mineralised areas, and many new mining regions are being found out. In 1950, about 460,000 persons were employed daily in all the mines in India. Of these 350,000 persons were employed in coal mines.

Of the various minerals found in India, the most important are coal, manganese ore, gold, mica, iron ore, and salt. She is the world's main source of supply of ilmenite, monazite and zircon.

The mineral resources of Indian Union encompass a sufficient range of useful products that are required to make a country industrially self-contained. The division of India has not affected the Indian Union very much in the matter of minerals. Except for petroleum, chromite, gypsum and Fuller's Earth, Indian Union has a complete monopoly of other minerals.

Lead, copper and zinc are also found, though not in sufficient quantities. Sulphur, in which India was lacking until lately, is at present available.

Considering the size and population of the country, the mineral wealth is not so vast as it is supposed to be. India's position with regard to supply of industrial minerals is as follows:—

(I) Minerals in which India has large exportable surplus to dominate world markets.

Iron ore	Titanium ore	Mica
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(II) Minerals of which the exportable surplus forms an important factor.

Manganese ore	Steatite
Bauxite	Silica
Magnesite	Monazite
Refractory minerals	Beryllium
Natural Abrasives	Corundum

(III) Minerals in which India may be considered self-sufficient.

Coal	Gypsum
Cement materials	Glass sand
Gold	Borax
Aluminium ore	Pyrite
Copper ore	Nitrates
Chrome ore	Phosphates
Building stones	Zircon
Marble	Arsenic
Slate	Barytes
Mineral pigments	Precious and semi-precious
Industrial clays	stones
Sodium salts and alkalis	Vanadium
Limestone and Dolomite	Antimony

(IV) Minerals in which India has to depend largely or entirely on foreign imports.

Silver	Tungsten
Nickel	Molybdenum
Petroleum	Platinum
Sulphur	Graphite
Lead	Asphalt
Zinc	Potash
Tin	Fluorides
Mercury	

The credit for discovering the presence of monazite in the sands all over the beaches of Travancore and Cochin goes to a German scientist—W. D. Schemberg—who did it in 1909. As rains erode the rock in the Nilgiris and other adjacent hills, the particles are moved and washed into the ocean as sands. Some of these sands as a consequence of a peculiar force of sea currents are swept back and deposited on the beaches. Monazite, ilmenite, zircon, garnet and silmenite are obtained from such sands. Monazite sands, can be processed to yield thorium, cerium, and other rare earths which India has been importing for use in various industries, such as the gas-mantle industry and metallurgical operations for manufacture of special flints, aluminium base alloys, etc. Traces of uranium, used in the production of atomic energy, may also be present in Monazite sands. The Government of India has recently started a factory at Alwaye (Travancore) to work monazite for thorium and uranium.

The position of India with regard to Sulphur is serious. Although consumption at present does not exceed 50,000 tons a year, the indications are that with the increase in the output of chemicals and fertilizers, the requirements will go up. Unfortunately, India does not produce sulphur at all and depends on the U.S.A. and Italy. Before the partition of India, the only source of sulphur was Baluchistan (now in West Pakistan). In 1951-52, India imported 745,618 cwt. of sulphur valued at Rs. 1.16 crores.

The production of lead in the country is not sufficient for the requirements. Normally India requires about 17,000 tons of lead while the production is hardly 1,500 tons. Lead has therefore to be imported from U.S.A., Australia, Mexico and Japan.

Imports of lead in recent years are (excluding ore):

Cwt.			Cwt.		
1948-49	...	164,849	1951-52	...	154,194
1949-50	...	148,109			
1950-51	...	311,738	1952-53	...	67,000

The principal lead mines in India are in Udaipur and Jaipur, both in Rajasthan. Production started from 1943.

India requires nickel for engineering and chemical industries. Unfortunately, however, there is not a single nickel mine in the country nor do we find any possibility of getting this material from the country in near future. India normally imports about 1,000 tons of nickel most of which comes from Canada. In future, nickel mines may be developed in Nepal where deposits are known to exist.

India consumes about 4,000 tons of tin and 12,000 tons of tinplate annually in the electrical goods industry, the metal container industry and the pharmaceutical industry. At present there is no tin mine in India and the entire requirements are met by importing tin from Malaya, Singapore and other countries.

Imports are:

Cwt.			Cwt.		
1948-49	...	66,566	1950-51	...	85,792
1949-50	...	71,394	1951-52	...	73,037

India does not produce zinc although deposits are known to exist in Rajasthan, Kashmir and Nepal. India imports zinc ore from Rhodesia, Australia, U.S.A. and Holland.

Imports of zinc:

Year		Imports (Cwts.)	Year		Imports (Cwts.)
1948-49	...	757,805	1951-52	...	417,830
1949-50	...	609,818			
1950-51	..	748,275	1952-53	..	461,149

One of the greatest defects of the Indian mining industry is that many of the minerals like manganese, mica, ebonite, chromite, refractors, etc., are worked solely for the purpose of export. And if this is continued for long, India will find herself depleted of valuable key metals and minerals.

The mineral wealth of India should be utilised for the benefit of Indian industries. Stoppage of export of key minerals and metallic ores in particular and control of the unrestricted export of raw manganese ore, chrome ore, mica, titanium ore, phosphatic materials and refractory materials in general, as well as a better adjustment of minerals, export and import tariff should be the measures in any scheme of planned economy of the nation's mineral wealth.

MINERAL PRODUCTION IN THE INDIAN REPUBLIC

	1948-49	1949-50	1950-51
Gold (ounces) ..	180,430	163,871	196,848
Iron ore (000 tons) ...	2,285	2,809	2,957
Manganese (000 tons) ...	526	646	902
Mica (cwt.) ...	151,273	151,709	N.A.
Copper ore (tons) ...	322,282	329,304	360,308
Ilmenite (tons) ..	229,416	250,023	212,663
Building materials (Rs. 000) .	31,628	30,031	N.A.
Coal (million tons) ...	31.7	32.0	34.1
Petroleum (million gallons) ...	65.6	N.A.	
Chromite (tons) ...	22,555	N.A.	
Silver (oz.) ...	12,797	N.A.	
Diamond (carats) ...	2,426	N.A.	
Graphite (tons) ...	1,649	N.A.	

Iron

Iron is by far the most useful of all metals. In fact modern civilization could not exist without it. One of the most significant features of the present economic organisation is that it is animated by the use of power; without iron the extensive use of mechanical devices driven by the energy from coal, petroleum and water would be impossible. Iron has contributed enormously to the development of the modern mechanical age, but, on the other hand, the mechanical age has created the present demand for iron. Here, cause and effect are linked in a continuing process.

India is the second largest iron-ore-producing country in the Commonwealth and occupies the seventh place in the list of iron-producing countries of the world. The production of iron ore is at present 3 million tons per annum. In 1950, the production was 2,957,000 tons. Her resources in the high grade iron ore are perhaps the greatest in the world, with the possible exception of Brazil. The production of iron ore is at present about 3 million tons per annum.

ESTIMATE OF IRON ORE RESERVES (million tons).

Province	District	Reserve	Province	District	Reserve
Bihar	Singhbhum	1047	Madhya		
Orissa	Keonjhar	988	Pradesh		
	Bonai	648		Bastar	810
Mysore	Babubudan	300		Drug	113
			Madras	Sandur	130
				Salem	304
					Total 4381

These reserves are supposed to contain 60 per cent. of iron. The output is influenced by the demand of the iron and steel industry which is, again, often handicapped by shortages of coal and transport facilities.

The value of an iron ore deposit depends not only upon its richness in iron, but also upon its location and the ease or difficulty of mining. India is fortunate in this respect because most of her iron-ore fields are found within easy reach of coal-fields. Dolomite and limestones necessary for smelting are also found in the neighbouring areas.

There are four different types of iron ores in India—magnetite, laterite, clay iron stone and haematite. The haematites are the most valuable iron ores in India, and both in quantity and quality they exceed any other ores of the same kind including the great American occurrences.

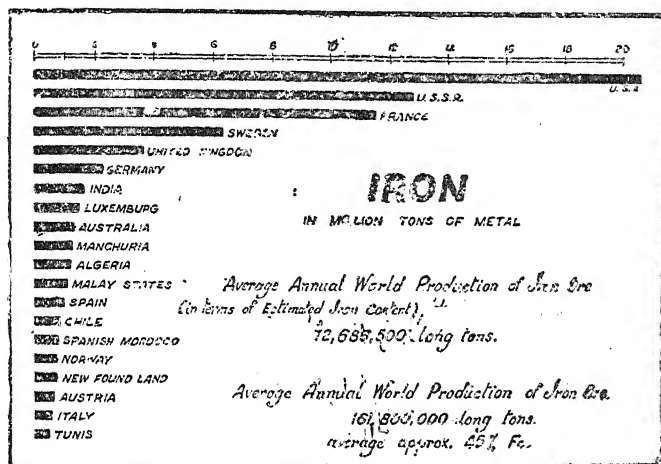


FIG. No. 46. India vis-à-vis World production of iron ore.

Though deposits of iron ore of good quality are found in many parts of India, the most important fields are confined to Singhbhum, Keonjhar, Bonai and Mayurbhanj of Orissa. The less important areas are in Madhya Pradesh, Madras and Mysore.

PRODUCTION OF IRON ORE* (1949)

Regions	Quantity (tons)	Regions	Quantity (tons)
1. Orissa:		3. Madhya Pradesh ...	838
Keonjhar ...	5,62,000	4. Mysore State ...	52,000
Mayurbhanj ...	8,00,000	5. Bombay:	
2. Bihar:		Ratnagiri ...	10,000
Singhbhum ...	13,64,000		

* At present, iron ores are being extracted on a fairly large scale by three companies, namely the Tata Iron and Steel Company, the Bird & Co. and the Indian Iron and Steel Company.

Mayurbhanj contains large deposits of high grade iron ore in three principal fields—Gurumahisani, Sulaipat and Badampahar. These three fields are all high lands and are connected by the branch lines of the Eastern Railway with Tatanagar, the centre of steel industry. These are also within easy reach of coal and dolomite fields and raise nearly one-third of the total Indian output. Singhbhum is the largest iron-ore-producing area in India and rich deposits of high grade haematite occur in Pansira Buru, Gua, Buda Buru and Noamundi, all in the Kahan estate. The iron contents of the ores in this area are greater than those of

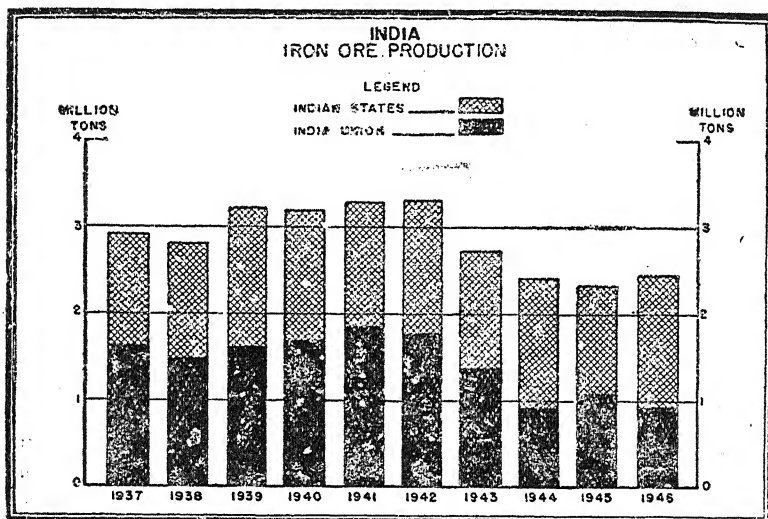


FIG. No. 47. Note the increased production of iron ore in 1941-42.

Mayurbhanj State. The fields are connected by the branch lines of the Eastern Railway.

Keonjhar possesses two fields—one in the Bagia Buru ridge and the other on the north-eastern part which is really a continuation of the Noamundi mine of Singhbhum. Manganese and dolomite are also raised in the neighbourhood.

Madhya Pradesh is rich in iron ores, but up till now the ores have not been exploited. In 1949, the total output was only 838 tons and these were mostly raised from the two fields of Lohara and Pipalgaon in the Chanda district. The Dalli and

Rajhara hills in Drug district and the Baster State hold out future possibilities.

In Mysore, the main source of the ore supply is the Kem-mangundi field in the Babubudan hills. Iron ores are also found in other places of Mysore but they are not worked at present. Goa and the Ratnagiri district in Bombay hold out future possibilities. Recently large deposits of iron ore have been discovered in Sandur and Salem, Trichinopoly and Kurnool districts in Madras. The quantity of ore has been estimated at 304 million tons at Salem—Trichinopoly, 3 million tons at Kurnool and 130 million tons at Sandur. These fields can be developed for the erection of a steel plant in South India.



FIG. No. 48. The iron-ore fields of Orissa. The Eastern Railways are serving the fields.

In Hyderabad, iron ores, mostly siliceous low grade, abundantly occur in Adilabad, Karimnagar, Warangal and Raichur. The exploitation of this iron ore will wait till the facilities for smelting low grade iron ore become available.

Iron ore reserves in India are much larger than the amount of coking coal available, and therefore, India can spare large quantities for export. The principal buyers are Japan, U. S. A. and U. K.

Manganese

Manganese is used for hardening iron and steel, in the manufacture of block enamel, in the chemical industry for the manufacture of bleaching powder and in electrical and glass industries. India is the third largest Manganese producer in the world, led by the U.S.S.R. and Gold Coast. "As the demand for

manganese is governed by its uses in the manufacture of steel, it is subject to great vicissitudes as the heavy industries rise and fall with the calls from trade and the manufacture of munitions."

THE CHIEF MANGANESE-PRODUCING COUNTRIES, 1947.

(In 000 long tons)					
U. S. S. R.	..	...	2,800	U. S. A.	124
India	.	..	916	Brazil	..
Gold Coast	..		589		110
South Africa	...	.	284	French Morocco	.
					102

Manganese mining in India engages nearly 10,000 workers who are mostly recruited from the adjoining districts of production. The quarrying is easily and cheaply carried out by unskilled labour.

PRODUCTION OF MANGANESE IN INDIA

(1950-51)				
(Long tons)			(Long tons)	
Madhya Pradesh	..	6,46,465	Bombay	61,598
Madras	...	33,809		
Orissa	.	76,691	Mysore	5,323

In 1950, India produced 916,080 tons of manganese ore. The reserves of manganese ore in India are by far the largest in the world. The total is estimated at 1,000 million tons of ferro-grade ore and 200 million tons of ore of lower grade.

The Madhya Pradesh is the largest producer of manganese ore; it is found there in the Balaghat, Bhandra, Chinduwara, Nagpur and Jabbalpore districts. The province raises nearly 60 p.c. of the total Indian output. The industry has received great impetus by the opening of the Vizagapatam port, which now permits easy movement of the mineral to the port by the Waltair-Raipur railway line. Before the opening of the port, M. P. had to depend on Bombay or Calcutta for exporting manganese outside. Hitherto it was difficult to sell outside second grade manganese ore because of the high railway freight from M. P. to Bombay and Calcutta. Now, because of the new railway line it is possible for M. P. to meet a large portion of the world demand for second grade manganese ore.

A noticeable feature in connection with the export of manganese is the rapid stride made by Vizagapatam since the commencement of its career as a modern port.

The following figures show how the exports of manganese ore from Vizagapatam increased since 1930 and those from Marmagao, Calcutta and Bombay decreased.

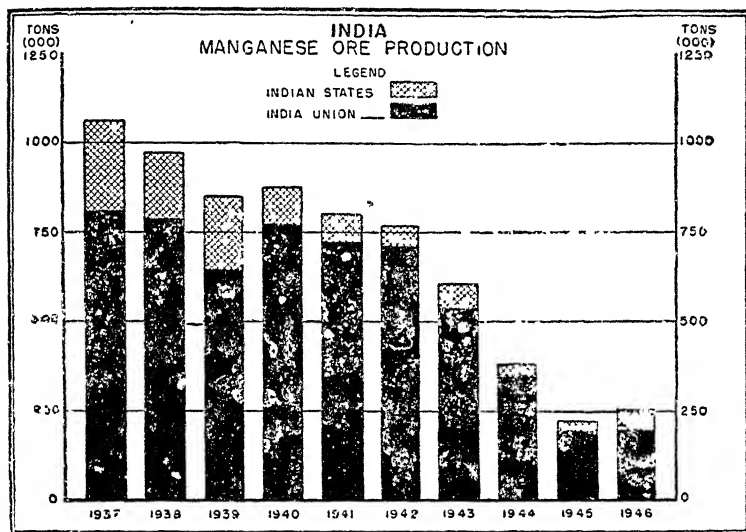


FIG. No 49. Production declined after 1940

SHARES OF PORTS IN THE MANGANESE TRADE (TONS)

	Vizagapatam	Bombay	Calcutta	Marmagao
1930	.. 4,500	2,97,738	3,00,211	1,70,577
1935	... 4,12,683	64,100	2,25,504	1,62,411
1939	.. 3,37,349	55,466	2,61,575	1,28,226
1951	... 6,10,312	—	1,65,448	3,67,596
1953	... 6,49,643	4,86,351	2,28,927	—

Madras produces a little more than half the output of manganese in the M. P. The producing areas are the Bellary district, Sandur State and Vizagapatam district. Much of the manganese ore is exported outside through Vizagapatam and Marmagao.

In Bihar, manganese ores are found in several parts of Chotanagpur, mainly in Kalhan and Singhbhum. A small production also comes from Chaibasa.

Gangpur and Keonjhar are the two important areas in Orissa for the supply of manganese. Bonai State and Ganjam also produce this ore in good quantities. In the Bombay State manganese ore occurs in the Panch Mahal district, Chota Udaipur and Ratnagiri. In Mysore, though the fields are widely distributed, the output is very small, being less than 1,000 tons, and it is raised in Chitaldrug, Kadur, Shimoga and Tamkur districts. Labour is easily available in Mysore.

Although there is a steady rise in the consumption of manganese ore by the Indian iron and steel companies, the prosperity of the industry will depend on its ability to put the mineral on the world market at competitive prices. The Indian iron and steel companies consume hardly 100,000 tons a year out of the total production of nearly 900,000 tons.

In 1952-53, India exported 1.3 million tons of manganese ore compared to 518,000 tons in 1938. About 75 p.c. of Indian manganese goes to U.S.A.

EXPORT OF MANGANESE ORE 1952-33 (TONS)

U. S. A.	...	..	890,907	France	.	...	45,750
Germany	...	..	146,913				
U. K.	..	...	136,584	Japan	...	..	46,626

Just before the outbreak of the Second World War there was a sharp decline in the exports of manganese from India, owing to over-production of manganese in the producing countries, the decline in the activities of the iron and steel industry of Europe and the U. S. A. and the increased competition of Russia. Once again the demand for Indian manganese is on the increase.

Copper

Copper is usually found in combination with silver, gold, iron, lead and sulphur. It is extensively used in the electrical industries as a conducting medium. In India, copper is particularly important for brass making and coinage.

India occupies the thirteenth place in the list of copper-ore-producing countries of the world. She supplies 11.3 thousand tons of contents of metallic copper out of the world's total of 1941 thousand. This figure compares very unfavourably with that of

the U.S.A., which raises an annual average of over 330 thousand tons. On the whole, the copper ore deposits in India are sufficient to meet the present and future requirements.

In India, copper used to be smelted formerly in considerable quantities in Southern India (Mysore and Madras), Rajasthan and in various other places.

At present it is mined on an extensive scale in two areas—Singhbhum and Nellore.

A copper-bearing belt persists for a distance of some 80 miles in Singhbhum where important fields like Mosabani, Ghatsila and Dhobani supply the major portion of the Indian output. The copper ores of Singhbhum are related to tongues of granite which intrude the Schists. The ore occurs as veins in the granite and in the neighbouring mica Schists, quartz Schists and hornblende Schists. The individual loads normally consists of one or more veins of sulphide varying in thickness from one inch to two feet, but the average is about five to seven inches. The average grade of ore contains about two per cent. copper. The copper mines of Singhbhum employ more than 800 persons. The Singhbhum copper mines are controlled by the Indian Copper Corporation Limited.

The Nellore district of Madras exploits the copper ores on modern lines but the output is very small.

Copper ore also occurs in Hazaribagh, Madhya Bharat and Mysore. Along the outer Himalayas, a belt of copper-bearing rocks runs through Kulu, Kangra, Nepal, Bhutan and Sikkim, which are now difficult of commercial exploitation owing to the inaccessibility of the areas and the lack of adequate communication.

Since 1930, the production of copper ore in India has been on the increase.

COPPER ORE PRODUCTION IN INDIA

Tons			Tons		
1930	...	1,23,749	1934	...	3,28,676
			1935	...	3,50,801
1932	...	1,75,010	1950	...	3,60,309

India also imports copper from U.S.A., Canada, Rhodesia, Japan and Portuguese East Africa. In 1952-53, she imported 412,000 cwt. of copper.

The prosperity of the Indian copper industry depends largely on the success of the brass-making industry. Recently, with the introduction of the aluminium products in the markets the demand for brass goods has fallen considerably in India.

Gold

Gold is mainly used for coinage and for the manufacture of jewellery. In the list of minerals in India, gold occupies the third place in value. But India's contribution to the world's total output of gold is only 2 per cent. and ranks fourteenth in the world. Gold is more widely distributed throughout India than any other useful mineral with the exception of iron ore.

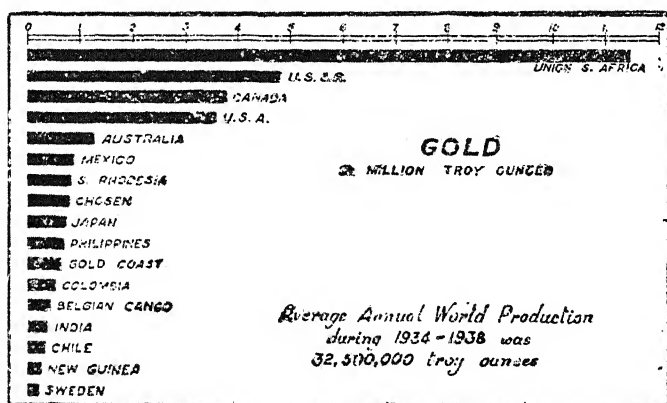


FIG. No. 50.

In India, gold is found in Mysore, Hyderabad, Madras, the Punjab, U. P., Bihar and Orissa. But the chief centre of gold-mining in the Indian Republic is the Kolar gold field which is situated in the Kolar district of Mysore State. This field produces about 99 per cent. of Indian gold. There are four important mines in the Kolar field. The Kolar gold-field is 40 miles from Bangalore and lies on a highland of 2,800 feet above sea-level "where there is a single gold-bearing reef of quartz some four miles long". The field employs more than 23,000 workers. Sivasamudram, 92 miles distant, supplies electrical power to the Kolar field. Two of the mines of Kolar field—Champion Reef and Ooregum—are among

the deepest in the world, well over 9,000 feet. The labour force on the Kolar gold-fields is of a very heterogeneous character. According to the Mysore Census Report, 1941, about 25·5 per cent. are Mysoreans and the rest outsiders from the West coast and Tamil districts bordering on Mysore State. About half the labour force belongs to the depressed classes. The quantity of gold produced at the Kolar fields from the commencement of operations in 1882 to the end of 1943 was about 20·6 million ounces.* The production of the field is, however, on the decline.

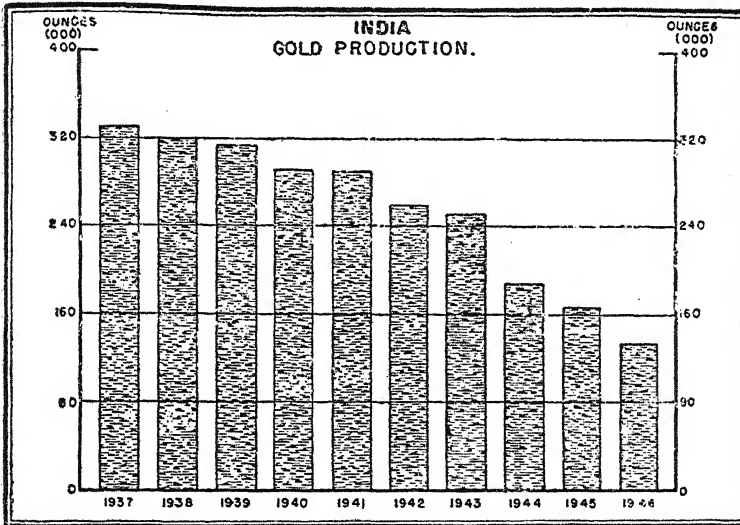


FIG. No. 51. Note the gradual decline in gold production. The maximum output was 556,527 ounces in 1905. The production in 1951 was however 226,000 ounces.

In addition to the Kolar gold field, some small production has been derived from the Bellara mine 60 miles west of Bangalore, which has been re-opened by the Government of Mysore.

Not long ago the Raichur district in Hyderabad and the Dharwar district in Bombay produced a fairly large quantity but these fields have now practically been closed down. Shortly, production on a small scale can also be expected from the Hutti mine in Hyderabad where the equipment for the milling plant, which

* Report on Gold Mining Industry in India (Govt. of India) 1946.

was delayed by the war, is now in course of erection. Though Anantapur in Madras contains several large quartz reefs, it does not at present produce any gold. Gold deposits have been found in certain parts of Salem and Chittur districts of the Madras State. Investigations of these areas will soon start.

Alluvial gold is found with sands in many rivers of India. It is recovered by the local inhabitants. Such areas are Singhbhum in Orissa ; Ambala district in the Punjab ; Bijnour district in U. P., and the Brahmaputra valley in Assam. The value of gold thus obtained does not exceed £300 a year.

Mica

India is the largest mica-producing country in the world and produces about 50 p.c. of the world's production.

Mica has been used in medicinal preparations and for decorative and ornamental purposes since early times in India. Today, it is one of the chief strategic minerals and is indispensable in the electrical industry. Mica has important properties like transparency, breakability into thin films, flexibility, elasticity and resistance to heat and electricity. As a result, mica can be put to a number of uses. "The development of Wireless Telegraphy and Radio communication, Aeronautical Engineering and Motor Transport would have been impossible without it." Mica is also used as stove fronts, lamp chimneys, protective spectacles as well as in fire-proof points, patent roofing materials and as a decorative medium for fancy papers and ornamental tiles.

There is at present an enormous waste in the trimming and dressing of the crude mica. About 70 to 80 per cent. of the crude mica is dumped as unmarketable refuse in the Hazaribagh and Nellore mines. This waste mica is imported by the U.S.A. where it is turned to fine powder for various uses in electrical insulation.

The industry gives employment to about 32,000 persons. The aboriginal women and children who are generally employed in mica mines carry out the work with great skill.

Although mica is widely distributed, two principal areas control its production and trade. These are (i) the Bihar belt, a strip of country some fourteen miles broad and over 60 miles long, running obliquely across the districts of Hazaribagh, Gaya, Monghyr and Manbhum, and (ii) the Nellore district of Madras.

GEOGRAPHICAL DISTRIBUTION OF MICA (1949)

<i>Bihar:</i>	cwt.				cwt.
Gaya ...	22,000		Nilgiris ...	43	
Hazaribagh ...	80,000		Travancore ...	41	
Monghyr ...	1,500		<i>Rajputana:</i>		
Manbhum ...	140		Ajmer ...	600	
<i>Madras:</i>			Jaipur ...	400	
Nellore ...	12,000		<i>All India</i> ...	152,000	

Bihar may be regarded as the world's trustee for this mineral. The Bihar belt supplies more than 80 per cent. of the Indian output. Bihar mica is mainly of the ruby variety, the higher qualities of which, known as *clear and slightly stained*, are the finest in quality in the world and are greatly used in certain electrical industries. The Bihar belt runs in a general east-west direction along Gaya, Hazaribagh and Monghyr districts.

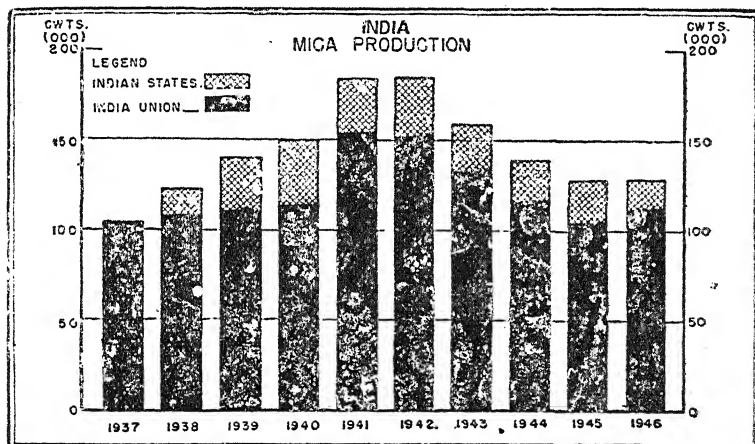


FIG. No. 52. Note the peak production in 1941-42.

The Nellore district of the Madras State raises mica by open quarrying at Gudur, Kavali, Atmakur and Raipur. The fields are in the coastal plain and extend for about 60 miles. The Nellore mica has a greenish colour and is inferior to Bihar mica.

Mica is also found in smaller quantities in Rajasthan (Ajmer and Jaipur), Travancore and Nilgiris.

The mineral is raised mainly for export because the internal consumption of mica in India is very small.

EXPORTS

Year		Qty. in cwts.	Value Rs.
1938-39	..	161,844	.
1948-49	.	340,257	5,93,73,869
1950-51	.	406,705	10,00,46,271
1952-53	..	283,751	8,99,45,457

The principal buyers of Indian mica are the U.S.A., the United Kingdom, Western Germany and France. The U.S.A. takes about 50 per cent. of the exports. Mica is a prolific earner of dollars.

The exports mainly go through Calcutta, Madras and Bombay. Calcutta alone handles 90 p.c. of the exports while Madras handles 10 p.c.

The imports of mica into U. K. from Canada and Brazil have recently affected the Indian trade. Today Brazil is not only developing as a competitor to India in international mica markets, but has also been seeking to process her mica in India. In order to protect Indian interests and prevent unfair competition against Indian mica, it is necessary to stop importation of Brazilian mica.

Moreover, synthetic mica, of which the well-known products are Pertinax, Bakelite, Paxolin and Formalite, is competing with natural mica.

Salt

In India, salt is mainly obtained from three sources—(i) from sea-water, (ii) from inland lakes and sub-soil water, (iii) from beds of rock salt. The chief salt-producing areas are Bombay, Madras and Rajasthan. More than two-thirds of the total production come from the sea-water of the Bombay and Madras coasts. Bombay salt works include Rann of Cutch, Kathiawar and the Bombay coast from Surat to Mangalore. Dharsana and Chharvad on the east of the Gulf of Cambay and Okha in Kathiawar manufacture salt in large quantities. Normally the manufacturing season is from January to June. A considerable quantity of salt also comes from the brine of wells on the Little Rann of Cutch. The saline content of the water is very high; and the salt is produced by solar evaporation.

In Madras, the salt-producing districts are mostly confined to the eastern coast extending from the district of Ganjam to

Tuticorin in the extreme south. Salt is also manufactured in the Udupi district in Malabar. Madras contributes more than 30 per cent. of India's total production. The average production is about 130 lakh maunds of salt. About 85 per cent. of production is

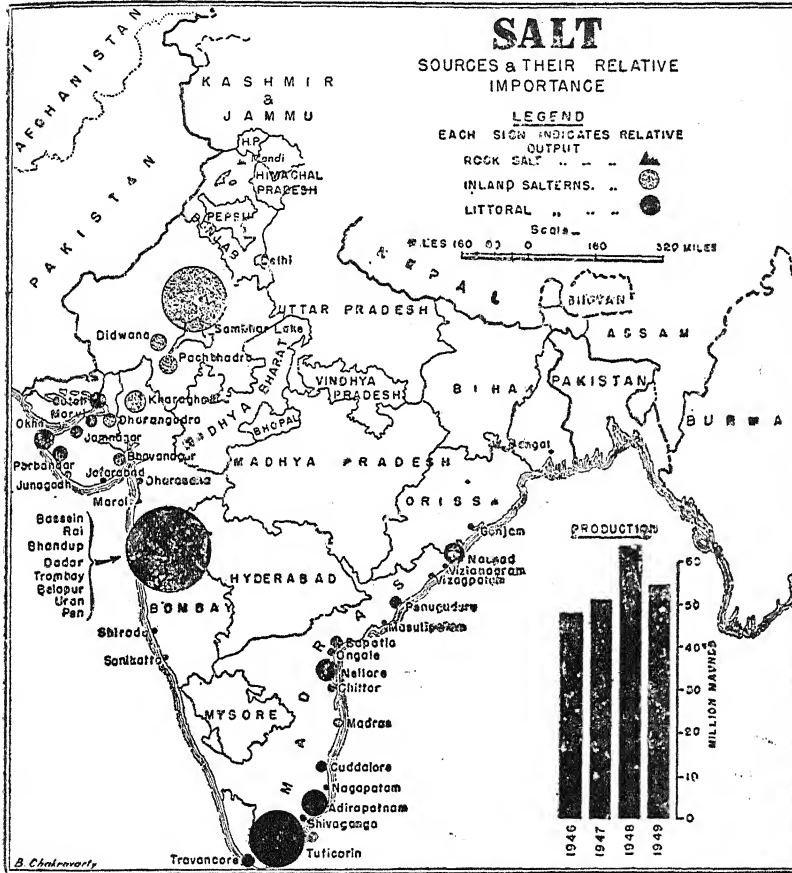


FIG. No. 53. The three principal Salt producing areas: Bombay, Madras and Rajasthan.

consumed in the province; the balance goes to Orissa, M. P., West Bengal and Mysore.

Notwithstanding her long seaboard, West Bengal has been a deficient area with regard to salt for more than a century. There

are reasons for meagre production of salt in West Bengal: (a) the low salinity of sea water in the Bay of Bengal due to discharge of large quantities of fresh water from the Ganges and the Brahmaputra; (b) the climate of West Bengal is very humid and does not favour salt manufacture by solar process; (c) the cost of manufacture of salt in Bengal is higher than the selling price of the imported article; (d) the small area of the sea coast intercepted by estuaries which are not favourable to salt manufacture; and (e) cyclonic storms from the Bay of Bengal. In West Bengal, a few small scale factories and cottage workers in the coastal districts produce salt from sea-water. The workers also produce salt by the artificial lixiviation process within scheduled areas of the coastal districts. Most of Bengal's requirements are met by imports from Aden, Port Said and the Red Sea ports. West Bengal also brings salt from the west coast of India and Madras. Salt production in West Bengal can be increased by the establishment of large factories along the Sundarbans and the Contai sea-board of Midnapore for manufacture of salt by the method of solar evaporation if possible during November—January when fair weather sets in. The most important factor which should be examined with regard to salt manufacture at Contai is the question of transport both by canal as well as by rail routes. Running parallel to the Contai sea-board is the Orissa coast canal which needs to be reconditioned to serve as an alternative means of transport to the interior of West Bengal. The railway line is about 40 miles from the sea-board. It will be necessary to bring the railway line as near as the sea-coast if salt industry is to be developed on an extensive scale.

Another important source of salt is the sub-soil and lake brines of Rajputana where there are many lakes. The Sambar Lake, the largest of all, covers an area of 90 square miles and produces about a quarter of a million tons every year. The reason for the high percentage of salt is that during the summer the south-western winds carry particles of salt from the Rann of Cutch and deposit them in the part, which are again washed into the lakes with rain water. The salt output in Rajputana in 1947-48 was 128 lakh maunds, comprising 100 lakh maunds from Sambar Lake. Rajputana Salt is mainly distributed to East Punjab, Delhi, U. P., Madhya Pradesh and Madhya Bharat.

Before the partition of India, rock salt used to come from the mines of the Punjab Salt Range and Kohat in the Frontier

Province. In India rock salt is available only in the Mandi State in the Eastern Punjab. The Geological survey of India have started a detailed survey of the rock salt deposits at Mandi to estimate the salt reserves and to determine the quality of salt that can be mined economically in this area.

SALT REQUIREMENTS IN INDIA

(in million tons)

Table and other household purposes	. 2 07
Livestock and other agricultural uses	.. 0 03
Fish Curing	0·01
Diary products	.. 0·01
Hides and Leather	. 0 07
Industrial uses	... 0 31
	<hr/>
	2 50

Thus in India, there is very little demand for salt for industrial purposes. About four-fifths of the requirements is for house-hold uses. In the U.S.A., however, three-fourths of the requirements is for industries. The demand for salt in India, therefore, is likely to increase a good deal with the advancement of the country and development of its industries.

Indian consumption of salt is about 620 lakh maunds. In deficit years the supplies are covered by imports mainly from Aden and Western Pakistan. The United Kingdom, Egypt and East Africa also send considerable quantities of salt. For the first time in hundred years, India achieved self-sufficiency in her salt requirements in 1951 when her total production was 744 lakh maunds as against 593 lakh maunds in 1949. India is now in a comfortable position to export salt to Japan and Pakistan. Efforts are also being made by the Government to improve the quality of Indian Salt to increase export.

Saltpetre has a great industrial demand. It is used in the manufacture of glass, for food preservation and for manurial purposes in addition to its importance as a constituent of gunpowder. Bihar and the Uttar Pradesh are the important pro-

ducers. The main centre of manufacture is Farrukhabad in U. P. Nearly the whole of the output is exported and a small part is retained in the country for the Assam tea-gardens. Saltpetre is exported to the U. S. A., China, the U. K., Mauritius, Ceylon and Straits Settlements. In 1950, the production of saltpetre in India was 7,000 tons.

Silver is obtained native and in combination with other metals, the chief of which are gold, lead and copper. Silver is used in India for the manufacture of ornaments, table utensils and coinage. India is by far the greatest consumer of silver in the world. In 1935, before the separation of Burma, the output of Indian silver amounted to 58,50,406 oz. of which Burma alone contributed 58,25,913 oz. India's production of silver in 1951 was only 17,000 ounces.

Silver is obtained from the Kolar gold-field in Mysore and Manbhum in Bihar. Anantapur in Madras, once an important supplier, does not raise it any longer.

Chromite has considerable demand in the manufacture of ferro-chrome, chromite steel and chromite brick. This is also the source of chromium salt necessary for tanning and dyeing.

Mysore is the principal supplier of chromite and contributes nearly 35 per cent of the Indian output. Shimoga and Hassan are the two main fields of Mysore where production is on the increase every year. About 20 p.c. comes from Keonjhar in Orissa. The Singhbhum district in Bihar raises nearly 14 p.c. of India's total ore. The other areas where chromite occurs are Ranchi and Bhagalpur districts in Bihar.

The annual production of chromite in India is about 19,000 tons. Practically the whole output is exported outside. The principal purchasers are the U. K., Norway, Sweden, Germany and U.S.A. The shipment goes through Madras and Calcutta.

Indian chromite has its rival in the European markets in those of Rhodesia and New Caledonia.

Antimony is a useful alloy for mixing with softer metals. Although India does not produce much antimony, the future possibilities for the development of this industry are great. Antimony ore deposits are found in Lahaul and Kangra district. A considerable quantity may also be obtained from the Chitaldrug

district in Mysore. In 1948, the production was 370 tons against 235 tons in 1947.

Tungsten or *wolfram* is used in the manufacture of hard steel and in the form of wire in electric bulbs. This metal ore occurs in Singhbhum in Orissa, the Marwar district of Rajputana and in M. P., but these deposits are small in quantities. The estimated annual consumption is probably in the neighbourhood of not more than 50 tons.

Gypsum is necessary for making fertilisers and in the making of certain kinds of paper. It is also used in India in considerable quantities in the cement industry. It can also be used as a source of sulphuric acid. It is found in Rajputana, East Punjab, Kashmir, Madras and Kathiawar. The Rajputana deposits occur in Bikanir and Jodhpur.

By far the most important producer is Rajputana where the mineral is found in Bikanir, Jodhpur and Jaisalmer. Rajputana raises nearly 80 per cent. of the Indian output. In Madras, the gypsum deposits occur near Trichinopoly.

The production of gypsum from all deposits in the Indian Union amounted in 1950 to about 129,000 tons.

Graphite is used in the manufacture of stove-grate polish and paints, as a lubricating agent for certain types of machinery and in making lead pencils. Up till now this mineral has not been very much commercially exploited although its deposits exist in Travancore, Godavari district, Vizagapatam, Orissa, M. P. and Ajmer-Marwara. In 1950, India produced 1,000 cwt. of graphite.

Asbestos is a silky, fibrous mineral found usually in veins. It is used mainly in the manufacture of fire-resisting materials. India raises a very small quantity of asbestos from the Bangalore district of Mysore, Ajmer-Marwara in Rajputana and Cuddapah district of Madras. India has to import every year large quantities of asbestos goods. There are, however, great prospects for an asbestos industry in India. In 1949, the production was only 146 tons.

Diamond. Although the Indian diamond industry is the oldest in the world, its present output is insignificant. In 1949, India raised only 1632 carats of diamond.

Diamond occurs in the Anantapur, Bellary, Kistna, Guntur and Godavari districts of Madras; Sambalpur district in Orissa:

Chanda district in M.P. ; and in Bundelkhand in Madhya Bharat. Warangal district of Hyderabad is rich in diamonds and the world famous Golacund diamonds were mined along the Krishna Valley there. Of late there have been no serious efforts to mine them.

Power Supply in India

For the purpose of industrial development, a country should have cheap motive power. The principal sources of power, available in India, are coal, wood fuel, oil, alcohol, wind and water.

The annual production of electricity in India is a little above 2,500 million units. "The consumption of electricity per capita in India is, therefore, a little over 7 units at the most. This is about $\frac{1}{4}$ that of Mexico, a country which the public in India considers rather backward and $\frac{1}{3}$ that of Bulgaria which is a very backward European country. This shows that in the scale of civilisation India comes quite as low as China, or Abyssinia, as far as production of electricity is concerned."

The situation of India, with regard to the supply of coal, wood fuel or oil, for the purposes of generation of power, is not quite favourable. Coal is of inferior quality and it is most unevenly distributed. Indian forests are generally confined to hilly tracts from where transport is difficult and expensive. The production of petroleum in India is decreasing and, therefore, unless new fields are found, it cannot provide power on a large scale.

Coal. In India, coal is the most important mineral product in respect of value and quantity. India is the second largest coal-producing country in the Commonwealth and occupies the eighth place in the world.

India raised 32 million tons of coal in 1951, and the output could easily reach 40 million, if necessary. Out of these 32 million tons India raised about 8 million tons of metallurgical coke, required for steel and other industries. We consume for our industrial purposes only 3 million tons of this coke a year. This surplus of 5 million tons of metallurgical coke might very well be utilised to stimulate our export trade until our industries require more coke.

A large part of the coal in India is less than one inch in diameter. There is practically no market for this "Slack Coal" although the slack coal produced from coking coals are often demanded for coke making. Again, coal gets broken during the mining operations. In spite of careful handling, some breakage is unavoidable. Attempts are being made for "briquetting" the slack and broken coal.

The division of India has not affected the position of the Indian Union with regard to coal supply. India's coal industry suffers from a number of drawbacks. Indian coal is generally poor in quality: its fuel properties, that is, the percentage and condition of carbon contents, are definitely lower than those of European or American coal. With the exception of Jharia coal, Indian coals have usually high proportion of moisture. The coalfields are again very unevenly distributed. More than 98 per cent. of the total output comes from one big belt—the Lower Gondwana coalfields (West Bengal, Bihar, Orissa, Madhya Pradesh and Hyderabad). The Peninsular India is very deficient in coal deposits and coal is totally absent in U. P. The transshipment of coal entails great difficulties in view of its bulky size. Hence it can be easily realised how expensive coal becomes as a source of motive power in industries in India, where coal must needs be carried over long distances. There is another consideration. It is not desirable to depend entirely on coal power as it is a diminishing asset and gets consumed in the process of power generation. It is necessary to conserve coal for purposes that require and must use thermal power. Coal is also one of the important raw materials for synthetic chemical industries.

The coalfields are not situated either near the coast or in the valleys of navigable rivers. In the United Kingdom, the coalfields are all found within easy reach of the sea-coast; in Germany the fields are found along the basins of the big navigable rivers. This distance of coalfields from the sea and navigable rivers compels the Indian coal industry to look to railways for the movement of its products and consequently the freight is high.

Coal reserves in the Indian Union of different varieties up to one foot thickness of seams and within 1,000 ft. are 60,000 million tons which are mostly found in the Gondwana Basin. The total workable coal is estimated to be 20,000 million tons.

TOTAL COAL RESERVES*

1. Darjeeling and Eastern Himalayas	100
2. Giridi, Deoghar	250
3. Ranigunj, Jharia	25,650
4. Sone Valley	10,000
5. Chattusgarh and Mahanadi	5,000
6. Satpura Region	1,000
7. Wardha Valley	18,000
	<hr/>
	60,000

Of these reserves good quality coal is only 5,000 million tons. The Indian coalfields committee (1946) however took a conservative view of the extent and possible duration of the nation's coal-wealth. It suggested that it would be wiser to proceed on the assumption that the reserves of good coking coal might not exceed 700 to 750 million tons. The coal reserves of the Indian Union are thus very small compared with those of U.S.A., U.S.S.R., England and Germany.

From the point of view of utilization, the Indian coal can be divided into five groups:

- (1) Coal suitable for metallurgical purposes: Such coal is found in Jharia, Raniganj, Bokaro and Giridi.
- (2) High grade steam coal (both high volatile and low volatile): the sources are in Ranigunj, Bokaro, Karanpura, Talchar, Madhya Bharat, Madhya Pradesh and Singareni fields.
- (3) Tertiary coals: Assam and East Punjab.
- (4) Low grade steam coal.
- (5) Lignites: Bikanir in Rajasthan and South Arcot in Madras.

Geologically, the coalfields of India may be divided into two classes: (a) The Gondwana system of strata extending from Bengal. Bihar and Orissa to Hyderabad including Madhya Bharat and Madhya Pradesh and (b) the Tertiary beds found in Assam and Rajputana.

* Power and Fuel (National Planning Committee Report), 1947.

The Garo Hills in Assam contain large deposits of very high grade coal. The Central Government decided to undertake prospecting the area directly. The coal in these fields may rank among the best in the world. These fields when developed will make Assam self-sufficient in coal, thereby releasing a large quantity for export. New coalfields have been discovered in Rewa, Madhya Pradesh (Pathakera and Koba) and Bihar (Hutar). Rail projects are under survey to serve these fields. Recently the Geological Department has also discovered lignite deposits in South Arcot districts, covering an area of 16 square miles with 32 feet in thickness. This is perhaps the longest "find" in India. It has yet to be tested to what use this lignite could be put—whether for locomotives, or for extracting gas or synthetic petroleum. Further, new coal deposits have been discovered by mining experts in the Daup area of the Nepal Tarai (the western districts of Khajawli and Soharatgarh). It is understood that the coal is high grade and it will not only meet the needs of Nepal and the adjoining Indian province of the U.P. but also could be exported to other areas if transport facilities are available. Digging operations have started with the help of the U.P. Government, and a 40-mile-long railway line is under construction from Basti, in the U.P., to the coalfields area.

REGIONAL DISTRIBUTION AND PRODUCTION OF COAL:

GONDWANA BELT

<i>Tons (1947)</i>	<i>Area</i>	<i>Fields</i>
7,646,357	West Bengal	Raniganj.
17,318,165	Bihar	Jharia, Bokaro, Giridi, Rajmahal Hills,
431,742	Orissa	Palamau (Aurunga, Hutar and Daltanganj), Talchar, Rampur (partly in the Sambalpur district and partly in the Raigarh State in M.P.), Ramgarh, North and South Karanpura.
569,026	Madhya Bharat	Umaria, Sohagpur, Singrauli.
2,590,411	Madhya Pradesh	Mohpani, Shahpur, Pench Valley, Waroro, Yeotmal, Ballalpur (also known as Sasti field. It lies partly in Hyderabad).
1,163,077	Hyderabad	Sasti, Tendur and Singareni
62,099	Rajasthan	Bikanir.

TERTIARY BELT

355,001	Assam	Nazira, Makum.
8,627	Kashmir	

Raniganj, the earliest coalfield to be worked in India, covers an area of 600 square miles. It contributes near about one-third of the total coal production in India. The Raniganj mines are the deepest in India and seams occur up to a depth of more than 2,000 ft. The Eastern Railways with their branch lines serve the field.

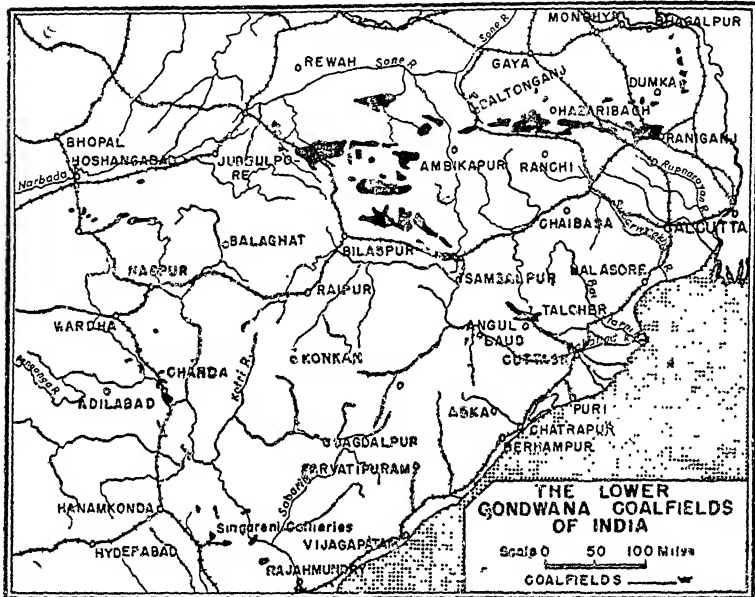


FIG. No. 54. Coalfields of Bengal, Bihar and M. P. (in parts).
Notice railway lines serving these fields.

The Jharia field, 140 miles north-west of Calcutta, covers an area of 175 square miles. It is 16 miles west of Raniganj. More than 50 per cent. of the Indian output comes from Jharia. Seams occur up to a depth of two thousand feet. The Eastern railways serve the Jharia field. The abundance, accessibility and high quality of this coal-bed have made the Jharia field the most important in India. It supplies coal used in the industrial areas of the Ganges valley from Delhi to Calcutta.

Close to the Jharia field to the west is the Bokaro field with an area of 220 square miles. The North Karanpura field is very

extensive and covers an area of more than 450 square miles. Though it is not important today, yet in future it may become a great supplier of coal. In 1930, North and South Karanpura raised more than 2 p.c. of the Indian output. The Giridi coalfield is a small one, but it yields some of the best coal to be found in India and largely used in metallurgical industry.

In Madhya Bharat, there are two fields—one is Sohagpur in Rewa and the other in Umaria, near Kātni. Sohagpur has an area of 1,200 square miles and raises nearly 1 million tons annually.

There are many coalfields in M.P. scattered throughout the Rewa-Gondwana basin, the Satpura region and Wardha valley. Two fields are very important—one in the Pench Valley in the Satpura region and the other, Ballalpur, in the Wardha valley. In 1935, M.P. raised more than one and half million tons of coal of the total 23 million tons. Recently a new coalfield has been located in the Khobra area in Madhya Pradesh. The field is stated to cover about 200 square miles divided into two sections each containing about 6 million tons of first grade coal per square mile.

In Hyderabad, the principal coalfield lies in Singareni, 146 miles from Hyderabad city. "The coal itself is a dull, hard, non-coking, steam coal largely consumed by railways and mills in southern India."

Tertiary coalfields are worked in Assam and Rajasthan, and they supply nearly 2 p.c. of India's total output. Assam raises more than 50 p.c. of the tertiary coal. Makum contains coal of excellent quality which is largely consumed by the railways, steamer companies and tea-factories in Assam.

Coal is used in India for the production of electrical power, for the running of railways, for propulsion of ships, for running other industries with steam power, for smelting purposes, for such industries as glass, cement, etc. and for domestic purposes. A small quantity is used for conversion to gaseous fuel.

Railways, iron and steel and brass foundries consume more than half of the total available coal in India. Domestic consumption is as yet small although intensive propaganda is being carried on for the popularisation of soft coke as a domestic fuel.

CONSUMPTION OF COAL IN INDIA (1952)

(in million tons)			
Railways	.. 11	Bunkar and Export	2
Iron, steel and brass foundaries and Textiles	. 5	Coking	.. 4
Cement	.. 1	Brick & Tile factories	. 4
Consumption at collieries	2	Port Trusts	. 1
		Other forms	.. 4

The demand for coal by the railways from the open market is sharply declining. This is because much of the requirements of coal of the Eastern Railways is met from their own collieries.

The coal industry of India gives employment to more than 230,000 people who are mostly recruited from Chotanagpur, Madhya Pradesh and Bihar. Many of these labourers do not work in the mines throughout the year. In the agricultural seasons, particularly in the harvesting periods, they go back to their respective villages. This problem of periodical shortage of labour in the coalfields has been solved to a certain extent by the use of electricity in the mines for pumping and coal-cutting.

Indian labourers are not very efficient. This is reflected in the low average annual output per head of labour in the mines. In the U.K. the average output per head is 290 tons (above ground) and 300 (below ground) as compared with 130 (above ground) and 180 tons (below ground) in India. The net annual production of coal per worker declined from 141 tons in 1938 to 92 in 1948. This decline in the productivity of labour has been caused not merely by reduced hours of work, but also by the need to resort to deeper-cut mining as upper seams have become exhausted and by the use of depreciated equipment not yet adequately replaced.

The large export trade in coal once held by India has fallen greatly in recent years. Ceylon, Straits Settlements, Penang, Aden and Perim used to take considerable quantities of Indian coal. The Japanese, Australian and South African competition before the Second World War brought about a great decline in the export of Indian coal. Exports of coal from India increased after 1949. Pakistan and Australia are now regular customers. Pakistan requires annually about 3.4 million tons of coal from external sources. If normal political and transportation relations are restored, Indian Union can supply the whole of Pakistan's requirements of coal.

The use of coal directly as a power is wasteful and uneconomic and can be avoided by converting coal into electricity. Besides, its conversion into electricity will permit the utilization of a number of by-products. "By electrification two-thirds of fuel consumed in industry and four-fifths consumed in colliery furnaces can be saved."

To solve the problem of shortage of labour, the Government has allowed women to work underground. The Government has further introduced a *coal control scheme according* to which all coal-owners are required to produce a certain minimum quantity and to work under conditions laid down by Government in regard to employment of labour, payment of wages, etc.

Petroleum

In terms of value, petroleum occupies the fifth place among the minerals of India. Its products are very important for the growth and expansion of many industries in India. Petroleum requires refinement before use. The manufacture of petroleum products is carried on by the distillation process. The refineries are mostly located near the oilfields and are capable of handling enormous quantities of crude oil. The products of petroleum are gasoline or petrol, fuel oil, kerosene and lubricants and these are used in steamships, railroads, manufacturing and domestic heatings. The position of India as a supplier of oil is very insignificant.

There is one distinct oil-bearing area in the eastern part of the Himalayan arc—Assam.

This oil-bearing belt stretches from the extreme north-east of Assam to the eastern borders of the Brahmaputra and Surma Valleys.* The Digboi field in the Lakhimpur district of Upper Assam covers an area of $2\frac{1}{2}$ square miles and is the most important oil-producing field in India. The important oil centres are Digboi, Bappapung and Hansapung. An up-to-date refinery near Digboi has been established recently to distil the crude oil. The workers in the Assam oilfields are mainly drawn from Assam, West Bengal, Nepal and the U.P. The percentage of the workers from Assam

* The oil supplies of Assam are obtained from rocks of Miocene age, like those of Iran and Caspian region.

is 22. In the Surma Valley some oil of poor quality is found in Badarpur, Masimpur and Pathania. In the Badaipur field, the production is on the decline.

The oilfields of Assam are connected by railway and rivers with Calcutta through Eastern Pakistan. There is now a direct railway link between Assam and West Bengal through Indian territory. Assam Railway which is now a part of North-Eastern Railway runs as far north as Sadya, a little north of Digboi. Digboi is connected by a branch line with Dibrugarh, an important river port. The Cachar field is practically on the main line of the railway.

PRODUCTION OF PETROLEUM PRODUCTS IN INDIA (1948)

Motor Spirit	..	15 million gallons
Kerosene	..	4,000 tons
Diesel oils	..	4,000 „

Production is too inadequate to meet the requirements of the country. Large quantities of mineral oil are imported from Iran, Bahrain islands, Saudi Arabia, U.S.A., Sumatra and Singapore. Bombay handles about 50 p.c. of the total imports of oil, followed by Calcutta with 25 p.c.

AVERAGE ANNUAL CONSUMPTION IN THE INDIAN REPUBLIC (based on 1948)

Motor Spirit	...	180 million gallons
Kerosene	..	66,000 tons -
Diesel oils	...	30,000 „
Furnace oil	.	53,000 „

Thus the Digboi oilfields of Assam which is now the only source of petroleum in India produces only about 8 per cent. of the total consumption of the country.

The low production of mineral oil in India cannot be a handicap to the progress of industries dependent on oil. India has inexhaustible resources for the manufacture of synthetic fuel oils from sugar-cane and oil-seeds. The sugar factories of India throw away every year nearly a quarter million tons of molasses

which could be very well utilised for the production of alcohol. When mixed with petroleum, this alcohol becomes an excellent fuel power for automobiles. In 1938 the Government of India passed an Act for the development of the power alcohol industry under the control of the Central Government and prescribed, inter alia, the admixture of power alcohol in a proportion of not more than 25 p.c. The production of power alcohol is at present at the rate of 4 million gallons a year and comes from U.P. and Bihar. In near future the production is likely to go up to 30 million gallons. It is also possible to utilise vegetable-oil contents for the preparation of fuel oil.

There is also the possibility of manufacturing synthetic oil from coal in India. The Government of India have been taking active interest in the matter and already an American firm on the request of India Government is preparing a report on its possibility.

There are possibilities of oil reserves in the northern strip of "Himalayan sequence" from south of Kashmir to north of Nepal, but the prospect of commercial success is very uncertain. Besides, the cost of exploration work itself is prohibitive. Mr. Percy Evans, noted British geologist, is of the opinion that outside Assam, India has very little prospect of any oil find in the foreseeable future. Even in Assam the disappointing results obtained in several places, after costly explorations, left little hope of new projects being undertaken. Even so, according to Mr. Evans, the area of Assam-Tipperah is the next possible oil source for India.

The Development of Hydro-electricity

Cheap power is the vital need of the country at the present moment. The total installed capacity of electrical power in India in 1946 was 1.4 million Kw. of which 494,000 Kw. was hydel power.

The aggregate water-power potential of India is very great being in the neighbourhood of 40 million Kw. although the total installed capacity has not passed the half million kilowatt mark. The magnitude of the water-power resources will be patent from the fact that India today exploits only about one per cent. of her water-power potential.

The ratio between the total water-power developed in various countries and their estimated water-power is as follows.—

	p.c.		p.c.
Soviet Russia	... 34	Norway	53
France	... 32	Canada	34
Germany	.. 54	U.S.A.	24
Switzerland	.. 54	India	1
Sweden ...	.. 27		

Possibilities are, therefore, immense in India for the development of water-power

Indeed, India promises to be one of the leading countries in the world in the development of hydro-electric power. The great advantage of water-power is that in the process of power generation, we merely utilize the gravity of water and do not consume any substance. "If we do not put this resource to use, we are not storing or preserving, we are merely wasting it."

Water-power schemes are, generally, difficult of materialisation in India, because the power needs to be continuous, while rainfall is seasonal. Hence, costly storage works are indispensable. Favourable sites for storage works exist in many parts of the mountainous and hilly regions where the rainfall is heavy. Hydro-electric schemes have developed in Bombay, Mysore, Kashmir, Madras, U.P. and East Punjab. Western India has practically no coal; but this is compensated for by the magnificent hydro-electric power resources in the Ghats.

In the Western Ghats of Bombay, there are three great hydro-electric power stations, developed respectively at *Lonavala*, *Nila Mula* and the *Andhra Valley*.* The Lonavala works are situated at the top of the Bhore Ghats where rain water is stored up in three lakes, namely, Lonavala, Walwan and Shirawata from where it is conveyed by canals and pipe lines to Khopoli at the foot of

* Water deposited by the monsoon rains on the Western Ghats normally finds its way to the Bay of Bengal by flowing in an eastwardly direction while dropping in its course of several hundred miles, between two and five thousand feet. The abrupt drop in the westerly direction was observed by engineers in the latter part of the last century to be a source of great potential energy provided a scheme could be devised to store and divert a portion of the water from the eastern to the western watershed and harness this energy at the time of its drop from the higher to the lower levels. The achievement of "harnessing the monsoon" gave birth to "The Tata Hydro-Electric System".

the Ghats for generating power. The Andhra Valley Power Supply Company is situated at Bhivpuri on the Andhra river where a reservoir has been constructed by means of a dam across the river. To the south-east of Bombay on the Nila Mula river a great hydro-electric scheme was developed in 1927 at Bhira. All

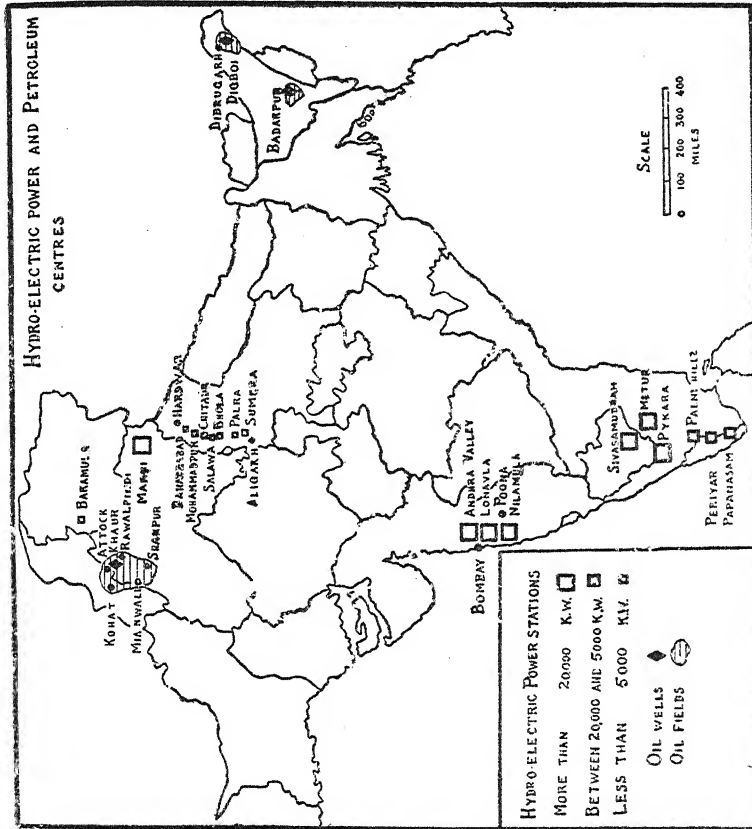


FIG. No. 55. Hydro-electric power and petroleum resources in India. Notice the great hydro-electric works in the western side of the Deccan.

these three works have been developed through the enterprise of Messrs. Tata and Sons of Bombay to provide Bombay, Thana, Kalyan and Poona with electricity for light, power, traction as well as numerous domestic and industrial applications.

Southern India has developed, in recent years, hydro-electric power at various places. The total installed capacity of hydro-electric power in South India is about 230,000 Kw, although 2 million Kw. can be made available. Madras has about half of this resource and the rest is in Mysore, Travancore and Cochin. This power is in great demand in the villages of the South for lifting water from wells for irrigation purposes. There are now about 15,000 electric pumps working in South India and irrigating about 100,000 acres of land. The rural areas of the South use about 10 p.c. of the total power production in South India. The power is also extensively used in Madras, Travancore, Mysore and Cochin for industrial purposes like development of electro-chemical and fertiliser factories, textiles, machine tools, aluminium, etc. In future, railway electrification of Southern Railway will make the area free from depending on Northern India for coal to the extent of 1 million ton a year. The first Hydro-electric scheme was given effect to in India in 1920 on the Cauvery river in Mysore with the object of supplying power to the mining companies in the Kolar gold-fields. The power house is situated at Siva Samudram, 92 miles from the Kolar fields. At present power is transmitted not only to the Kolar gold-fields but also to Bangalore and to about 200 other towns of Mysore. In Travancore there is one hydro-electric station at Pallivasal which generates about 22,500 Kw.

There are three important hydro-electric power stations in Madras: (a) Pykara, (b) Mettur and (c) Papanasam. The Pykara Hydro-electric Scheme was developed in 1932 on the Pykara river in the Nilgiri district. From here power is transmitted to Coimbatore, Erode, Trichinopoly, Negapatam, Madura, Virudhnagar.

The Mettur Hydro-electric Scheme is situated immediately below the Mettur Dam on the Cauvery. The Mettur Dam, one of the largest of its kind in the world, has been constructed mainly for irrigation, and part of the water let down for irrigation is utilised to the best advantage for the generation of hydro-electric power. The Mettur power scheme provides the districts of Salem, Trichinopoly, Tanjore, North Arcot, South Arcot and Chittur with energy. The Mettur scheme is linked with the Pykara works at Erode.

Madras has another scheme on the Tamraparni river at the foot-hills of the Western Ghats above Papanasam in the Tinne-

velley district which supplies power to Tinnevelley, Koilpatti, Madura, Tenkasi and Rajpalayam.

In the matter of rural electrification, Madras State is the leader. About 1450 villages receive electricity in Madras. The textile mills, cement factories, steel works, aluminium works, paper mills, Railway workshops etc. use hydro-electric power in Madras.

A number of schemes are being worked out in Upper India, particularly in Kashmir, Eastern Punjab and the U.P. for the manufacture of electrical energy from hydro-electric power resources. Kashmir has developed a hydro-electric scheme at Baramulla, thirty-four miles north-west of Srinagar. The power station utilizes the waters of the Jhelum river.

In East Punjab the Uhl River scheme supplies 50,000 Kw. power to the East Punjab Railway and to several industrial towns like Amritsar and Ludhiana. The Uhl from which power is generated is a small river in the Mandi State. The transmission system serves all big towns lying in the belt between Gurdaspur and Ferozepore as well as Simla, Ambala, Patiala and Gujranwalla. In near future the supply will be extended to Saharanpur, Meerut, Delhi and districts of Karnal, Panipat, and Rohtak. The scheme aims at providing industrial power and light to the towns of the Punjab and assisting agriculture in a number of ways by preventing water-logging and raising water to the required level on irrigated lands.

Recently in U.P. hydro-electric works have been opened in the Upper Ganges area to supply power to agriculture and industries. The Ganges Canal in its course from Hardwar to Meerut passes over 12 falls which range in height from 10 to 15 ft. The Government of the province made a scheme in 1926 to obtain energy from these falls and at present there are seven hydro-electric stations, situated as follows: Bahadurabad, Mohammadpur, Chitaura, Salawa, Bhola, Palra and Sumera. More than fourteen districts of the Upper Ganges area are served by these hydro-electric works. The Sardar Hydro-electric project at Banbassa, Uttar Pradesh, is one of the important development projects of the State. The Scheme when completed will generate power to the extent of 700 million units.

The various multi-purpose projects which are under construction will add, when completed, about 9 million Kw. of hydro-electric energy to the country.

QUESTIONS

1. On a sketch map of India, locate the places where water for hydro-electric power is being utilized for irrigation purposes. What manufacturing industries, in your opinion, can be developed in these places?
(Cal B Com., 1938, '27).
2. On a sketch map of India, show the regions where iron, manganese and mica are found. Which of these minerals are mined for home consumption? Name the countries of the world that compete with India in manganese for export markets.
(Cal. B.Com., 1937).
3. Draw a map of India and show the important sources of supply of coal, oil and hydro-electricity. What industries have grown around these regions?
(Cal. B.Com., 1934).
4. What are India's available sources of power? To what extent is she using them and for what purpose?
(Cal. Inter., 1941).
5. Describe the principal coalfields of India and discuss the present condition of the coal industry in India.
(Cal. Inter., 1938).
6. Draw a map of India showing the regions where the most important minerals are found.
(Cal. Inter., 1937, '33, '45).
7. Examine the important minerals to be found in India and the places where they are found.
(Cal. Inter., 1939, '37, '34).
8. What do you know of the hydro-electric development of Northern India? What are the sources from which this power is obtained there and to what use is this supply of power mainly put?
(Cal. B Com., 1930).
9. What is the place of India as producer of non-ferrous metals? State briefly the minerals which occur in India and how they are mined.
(Cal. B.Com., 1930).
10. Examine the present position of the coal industry in India. Indicate the methods by which the condition of the industry may be improved.
(Cal. Inter., 1938, '35).
11. Examine the iron resources of India. Show how far these are located near the coal-bearing areas in India.
(Cal. Inter., 1936).
12. "India is the leading mica exporting country of the world and is likely to remain so." Examine the statement.
(Cal. Inter., 1945).
13. State the places in India where the following are found: (a) manganese, (b) copper, (c) mica, and (d) salt. Also mention their commercial uses.
(Cal. Inter., 1944).
14. How is it that in India most of the hydro-electric installations are located in the Deccan? Discuss the factors which should be present for the development of hydro-electric power.
(Cal. Inter., 1949).
15. On a sketch map of India show the regions producing Coal, Manganese and Mica, and the principal railway-stations which handle these minerals.
(Cal. Inter., 1949).

16. Write an account of the development of the water power resources in India and discuss the benefits of such development on our economic life.

(Cal. Inter, 1951).

17. Give an account of the Mineral Resources of India and the extent to which they are utilized.

(Agra B Com., 1952).

18. Examine India's power resources and explain how far they are adequate for the future industrialization of the country

(Agra B.Com., 1953).

CHAPTER IX

PRINCIPAL MANUFACTURING INDUSTRIES

In recent years several important manufacturing industries have been established in India. The relative importance of the principal industries in India is determined generally on the basis of the number of workers employed.

In 1948 the manufacturing industries employed 17 million workers, the distribution of which was as follows:

Cotton industry 42 p.c., jute 20 p.c. general engineering 8 p.c., sugar 6 p.c., iron and steel 4 p.c., others 20 p.c. Of the total wages and salaries paid to the industrial workers in India, about 52 p.c. is being accounted for by the cotton industry followed by jute (15 p.c.), general engineering (8 p.c.), iron and steel (6 p.c.) and sugar (4 p.c.).

INDUSTRIAL DISTRIBUTION IN INDIAN UNION

	No. of Factories		No. of Factories
Cotton Mills . . .	393	Chemicals . . .	35
Jute . . .	106	Paper ..	16
Sugar . . .	142	Match . . .	107
Iron and Steel . . .	13	Woollen Mills . . .	22
Cement . . .	13	Silk Factories ..	90
Soap . . .	16		
Glass . . .	77	Total	1,030

The distribution of manufacturing industries in India is very uneven. The principal manufacturing regions are as follows: (a) Hooghly basin in West Bengal: about one-third of India's industrial development, with all the jute mills; (b) The Bombay Cotton belt with Bombay, Ahmedabad and Solapur; (c) Chotanagpur with Jamshedpur as the centre for iron and steel industry; and (d) the Nilgiri group in Madras and Mysore for textile industries. From the point of view of number of persons employed in manufacturing industries, Bombay heads the list with 34 p.c.,

West Bengal 31 p.c. and Madras 10 p.c. It has been found that some industries would always concentrate in particular localities. The centralisation of industries is noticeable in cotton textiles, jute, sugar, paper, matches, wool, silk, leather and iron and steel production.

This tendency towards centralisation is now being criticised in many quarters. There is a feeling that location of an industry should be made on the basis of the distribution of population in different provinces.

The decentralisation of industries is desirable to give as far as practicable equal opportunities of development to every State. Bombay, Delhi, Baroda, Mysore, Ajmer-Merwara and Madhya Bharat possess more mills measured in terms of demand for cloth by the people of these provinces while there is little or no development of cotton industry in areas like Assam, Orissa, Andhra, Eastern Punjab and U.P. West Bengal and Uttar Pradesh should have more cotton mills because a large portion of the internal demand for cloth at present is met from outside supplies. Since the market for cloth is measured by the distribution of population, the same basis should be followed in the establishment of cotton industries in different provinces.

Iron and steel, silk and sugar industries, match factories and paper mills have considerable scope for decentralisation. On the other hand, the jute and woollen industries cannot at present be made capable of dispersal.

The principal manufacturing industries of India are almost entirely in the hands of private sector and are controlled both by the Indians and the Europeans. The European capitalists have invested more than Rs. 90 crores in purely manufacturing industries. The jute mills of Bengal, the tea-plantations of Assam, gold and coal mining, engineering works, and woollen mills and tanneries of Kanpur are practically in the hands of the Europeans. The main cause of the supremacy of European capital is that indigenous capital is not forthcoming in quantity "for accelerating the progress of our material and industrial regeneration". Moreover, the country lacks in capital goods and technical personnel. In more recent years, the indigenous capital has been coming out freely, and its greatest achievements are in the lines of cotton

mills industry, iron and steel industry, sugar factories, cement works and small mills. Recently many higher technical institutions with research facilities have been established in different parts of India which will make technical manpower available within the country in increasing numbers.

In the list of the major industries the two characteristics are the predominance of the textile industries and the sub-ordinate position of chemicals and paper.

In the first 5 year plan, the Central Government has made a provision for investing Rs. 94 crores towards the development of capital and producer goods industries which are of basic national importance. Such industries are iron and steel, shipbuilding, locomotives, machine tools, fertilisers and heavy electrical. For the time being capital and producer goods industries like aluminium, cement, heavy chemicals and petroleum refining will not receive direct interest from the Government.

The Cotton Textile Industry

India is now one of the leading cotton manufacturing countries of the world; she is second in the production of cotton and third in the number of persons employed among the countries manufacturing cotton. Indeed, "the Indian cotton textile industry is the most significant example of national achievement in the industrial sphere and is a symbol of India's potentialities as an industrial country".

The first cotton mill in India was started in Ghosery on the Hooghly in 1822. The real progress started from 1854 when Bombay had its first cotton mill. At the end of the year 1951 there were 425 working mills giving employment to more than 5,00,000 persons in India.*

The production of cloth in the Union is 6,045 million yards compared with 453 million yards in Pakistan for the year 1949-50.

At the present moment four areas lead in the production of cotton goods. These are Bombay, West Bengal, Madras and U.P.

* In the same year, there were 194,000 looms and 11 million spindles.

GEOGRAPHICAL DISTRIBUTION OF COTTON MILLS IN
INDIAN UNION (1949)

Provinces	Existing Mills	Provinces	Existing Mills
Bombay	198	Gwalior	8
Madras	47	Rajasthan	10
U P.	26	Hyderabad	6
West Bengal	40	Ajmer-Merwara	4
M.P.	8	Berar	4
East Punjab	4	Mysore	6
Delhi	4	Cochin-Travancore	3
Indore	7		

The lines of cotton manufactures consist of yarn and woven goods : and these supply more than 80 per cent. of the country's requirement for mill-made goods. The woven goods are grey and bleached piece-goods, coloured piece-goods, hosiery, cotton goods mixed with silk or wool and miscellaneous.

Bombay has 198 mills, of which Bombay Island and Ahmedabad possess 70 mills each. Judged by the quantity and value of production, Bombay ranks first in the list of cotton-manufacturing centres. Next to Bombay city, Ahmedabad is the second largest cotton-manufacturing city in the country. In the State of Bombay, the third centre is Sholapur followed by Poona, Surat, Broach, Hubli, Belgaum and Jalgaon

The localisation of cotton industry in the city and Island of Bombay has been governed not so much by natural and permanent factors as by capital and credit advantages, the presence of adequate means of communication and the fact of Bombay being a port. The climatic condition of Bombay is such that it favours the production of yarn of finer counts, but the preponderance of higher counts is a feature of the Ahmedabad cotton industry and not so much of Bombay. Again, Khandesh, Berar and Wardha, where raw cotton is grown, are nearer to Ahmedabad than Bombay. When the cotton textile industry was established, Bombay had not developed hydro-electricity and depended on Bengal for coal. The cotton industry in Bombay city draws its labour force mostly from the neighbouring districts of Konkan, Satara, and Sholapur. The supply of labour also comes from the Deccan and the Uttar Pradesh.

In spite of all these defects, Bombay is still the principal centre of the industry. It proves, therefore, that certain advantages are

definitely on the side of Bombay such as, (i) credit and banking facilities, (ii) the natural harbour, etc. The cotton crop of the province gravitates in large quantities to Bombay for export and so a special flow of cotton for the purpose of mills need not be created. The port also enables Bombay to import machinery and other requirements from England, Germany and U.S.A. with ease.

Therefore Bombay has combined the textile specialisation of Manchester with the commercial and shipping characteristics of Liverpool.

The bulk of the cloths produced in Bombay City consists of light texture cloths made from medium count yarns. During recent years many Bombay mills have specialised on fine count cloths. Longcloth, shirting, T. cloths, domestics and sheetings account for more than 50 per cent. of the production, while the remainder consists of dhoties and coloured goods.

The first cotton mill at Ahmedabad was started in 1859. The industry has made tremendous progress since 1929. In 1944, the city had 70 mills and employed about 130,000 workers. The principal sources of labour supply are Ahmedabad district, Baroda and Gujrat. About 60 per cent. of labour comes from these places. Rajasthan supplies about 12 per cent. of labour force. Ahmedabad is capable of producing almost any grey, bleached, woven coloured or printed cotton fabric in general demand. Her annual production exceeds 1,000 million yards of piece-goods. Ahmedabad also produces dhoties and saris on an extensive scale.

The Cotton Mill Industry in West Bengal has made exceptional progress in the last ten years. At present the production is mostly confined to grey and bleached goods with dhoties for home consumption predominating. There are now 40 cotton mills in West Bengal and a few more mills are in the course of erection. The industry is located in three districts, namely, 24-Parganas, Howrah and Hooghly—all along the Hooghly basin, within a radius of 32 miles from Calcutta. The Hooghly basin offers unique opportunities for the development of industries inasmuch as the area is served by a perfect network of railways and riverways. Calcutta, by bringing mill machinery and raw cotton from abroad, distributes them to the different cotton centres of the Hooghly basin. The economic advantages of Calcutta in being near to Jharia and

Raniganj coal-fields, besides being itself a money and labour market, have influenced greatly the concentration of cotton textiles around the city. The mill centres are Sodepur, Serampore, Panihati, Shamnagar, Maurigram, Belgurriah, Palta, Fuleshwar, Salkia and Ghosery—all in the districts of Howrah, Hooghly and 24-Parganas.

The prospects of cotton mill industry in West Bengal are indeed very bright. West Bengal is a great market for cotton goods in India. The Bengal mills cannot satisfy the local demand to any appreciable extent. Thus the Bengal mills have before them a wide scope for expansion. Moreover, the neighbouring provinces of Assam, Bihar and Orissa will offer a vast market for the Bengal mills. As the province is intersected by many rivers, the atmosphere is very humid.

The moist climate of Bengal is no less important. Cotton industry requires moist atmospheric conditions, otherwise thread breaks. The climate of the province is certainly an advantage, if not over Bombay and Ahmedabad, at least over the upcountry towns of Kanpur and Delhi, where humid atmospheric conditions are created in the mills artificially. As regards labour, "a factor very much in favour of Bengali labour is that he is more intelligent, though physically a bit poorer, than outside labourers. But workers in the mills do not presumably require very strong physique, because the operations are such as require a sensitiveness to touch and flexibility of fingers more than physical exercise, which it does not take long time to develop."

The only problem is the question of raw materials. Bengal is situated far from the cotton-growing areas of India. But then, the high price paid for raw cotton will be compensated largely by the economy in the freight on coal.

The third largest cotton-manufacturing province is the Uttar Pradesh. Its disadvantage of being located far off from the coal-fields is compensated by the presence of a large local market, cheap and efficient labour and excellent transport facilities. The cotton industry is particularly confined to the Ganges towns. *Kanpur is the most important cotton manufacturing centre.* Although the first cotton mill at Kanpur was started as early as 1861, the real progress was noticeable from 1935 onwards. The city has now 17 cotton mills. The bulk of the labour force in the mills comes

from the neighbouring agricultural areas. The cotton manufactures in the U.P. are yarn, grey and coloured piece-goods, hosiery and carpets. The U.P. produces about 230 million yards of cloth per annum, of which grey and bleached goods account for 95 per cent. of the production. Cotton carpets are becoming important of late, and the centres of manufactures are Bareilly, Aligarh, Agra, Moradabad and Etawah. Tentage and *dosuti* fabrics are made in Kanpur.

The growth of the cotton mill industry in South India during recent years has been phenomenal. South India possesses certain geographical advantages in respect of raw materials and power resources developed as a result of hydro-electric schemes. The districts of Coimbatore, Madura and Tinnevely are important zones. The cotton mill centres are Coimbatore (31 mills), Madura (10 mills), Salem (4), Tinnevely (4), Malabar (5), Madras, Guntur, Bellary and East Godavari. Mysore, Trivandrum and Padukota are other centres. The South Indian cotton mills concentrate mostly on spinning as about 16 p.c. of the total spindles of India are to be found here. Only 4 per cent. of the total loomage of India is in South Indian mills.

Madhya Pradesh is an important centre of cotton manufacture in India. The plains of Berar and Nagpur lying to the west in the valleys of the Purna and Wardha rivers contain rich black soil which makes the area a great cotton-growing region. The cotton mills are located at Nagpur, Akola, Hinganghat, Rajnandgaon, Budnera, Burhanpur, Ellichpur and Pulgaon. From the point of view of labour employed, Nagpur is the most important cotton textile centre in M.P. A large proportion of the workers in the Nagpur mills belongs to what are known as the scheduled castes. There are now eight mills in M.P.

Delhi specialises in the production of coarse count cloths and produces considerable quantities of dhoties and tentage materials and excellent upholstery and tapestry fabrics.

Long-stapled cotton requirements of Indian mills are met by importation from Egypt, East Africa, Sudan, U.S.A. and Pakistan. Indian Union may import long-stapled cotton from Pakistan to the extent of 1 million bales. The Indian mills consume annually about 4 million bales (400 lbs. each) of raw cotton.

CONSUMPTION OF RAW COTTON IN THE INDIAN MILLS:

(in bales of 400 lbs. each)

Origin	1947-48	1950-51
India	2,863,450	2,791,000
Pakistan	723,216	5,000
Egypt	305,697	253,000
Other foreign countries	318,519	573,000
	<hr/> 4,210,882 <hr/>	<hr/> 3,622,000 <hr/>

The development of Indian cotton mills industry has considerably affected the Lancashire cotton industry. Formerly Lancashire had a strong hold on the market of India.

The entry of Japanese cotton piece-goods in India before the Second World War adversely affected the Indian industry, more particularly the Bombay cotton industry. *The Japanese manufactures had several advantages over their rivals in Bombay and Lancashire.* The real strength of Japan as exporter of piece-goods rests largely on the ability of the small factories situated throughout the country to produce goods at a low cost. Many of the weavers in Japan are part-time farmers. Even the wives, mothers and elderly relatives of the farmers work in the mills. These operatives are satisfied with a very small remuneration. Organised buying of raw cotton from America and India give Japan some additional advantage. Total freight on both raw cotton and piece-goods, from India to Japan and back, is very low. State-aid to cotton industry in Japan was also a great contributing factor in its expansion.

Cotton twists and yarns and piece-goods of India are exported to Burma, Straits Settlements, Syria, Aden, Siam, Iraq, Arabia, French Somaliland and other countries where Indian immigration is considerable. Bombay is the principal port for shipment. India exported about 560 million yards of mill-made piece-goods during 1952-53. In 1950 India was the leading exporter of cotton fabrics in the world though a year after she had to yield the place to Japan. Today, India's position is fourth as a cotton goods exporter.

Since 1939 the cotton textile industry of India has been passing through a period of prosperity unparalleled in its history, due to

the virtual elimination of all imports. There is still immense scope for further development of the industry.

Many new types of cloths, such as, khaki, cellular shirting, cotton webbing of various descriptions and jute cotton union canvas are manufactured.

PRODUCTION OF COTTON MANUFACTURES IN INDIA

	Yarn (in million lb)	Cloth (in million yds.)
1948	1440 385	4298
1950	1174 220	3718
1952	1500 000	4800

India can look forward confidently to a long period of post-war prosperity in the cotton textile industry, provided her industrialists exercise enough forethought and bring about a reduction in manufacturing costs, so that she can compete with her potential rivals. India has already captured the cotton markets of Iran, Arabia, Iraq, Aden, Australia, New Zealand, South Africa, etc. As these are essentially *price markets*, Indian cotton industry must try to reduce its cost of production, so that when normal trade will be resumed the other countries may not drive out Indian cotton goods from these markets.

Pakistan is likely to be dependent for the supply of cotton piece-goods on the Indian Union to the extent of 500 million yards.

The Jute Mill Industry

The Indian jute industry is one of the biggest industries of the country and a prominent source of foreign exchange. The jute industry owes its development to foreign enterprise. Till 1828, the manufacture of gunny bags and cloth was in the hands of the Bengal peasant weavers and the production was very small. But after 1832 when it was found that jute might be used as a substitute for hemp as a result of the experiment carried out by a Dundee merchant, the demand for jute increased. In course of time, the bleaching and dyeing processes improved and jute finally gained rapid popular favour. Thus the foundation of the

jute-manufacturing industry was laid first in Dundee and later in 1855 in Calcutta.*

After cotton, jute is the most important industry in India. "In point of efficient organisation, the jute industry is perhaps second to none in India." The industry employs a daily average of nearly 3,00,000 workers. In 1940, the Indian Union had 68,416 looms which worked out to be 57 per cent. of the world's total. Great Britain and France came next with 9 per cent. and 6 per cent. respectively.†

Calcutta has the leadership in jute mill industry. Practically all the mills are in the neighbourhood of Calcutta on the banks of the Hooghly.

States	Mills	States	Mills
Bihar and Orissa ..	3	Uttar Pradesh ...	3
Madras	4	West Bengal ..	95

There are certain geographical factors for this localisation of jute industry along the Hooghly basin within a radius of 40 miles of Calcutta. Since the jute mill industry aims at exporting its manufactures abroad, the question of accessibility to the port is of main consideration. The location of the jute mills along the Hooghly basin is such that the mills can bring raw materials with ease from the interior and can export its products readily through the port of Calcutta. Had jute mill industry been mainly intended for home market, its location would have been near the sources of raw materials. Regular steamer and boat services connect Calcutta with the jute-growing districts of East Bengal. West Bengal's raw jute is brought partly by rails and partly by rivers. As Calcutta is a port, raw jute is also sent to this place for export. Thus the supplies of jute are always available for mills. Coal is within easy reach of Calcutta and the distance of Ranigunj and Asansol coalfields is only about 120 miles. As a matter of fact, this proximity to the coalfields is of great advantage to Calcutta.

* The first jute mill in India was erected at Rishra near Calcutta by the enterprise of George Aucland, an Englishman.

† Indian Central Jute Committee Report on the marketing of Jute and Jute products, 1940.

Humid climate necessary for jute manufactures is also the characteristic of the Hooghly basin. Calcutta is an industrial centre and so there is a regular flow of labour from the neigh-

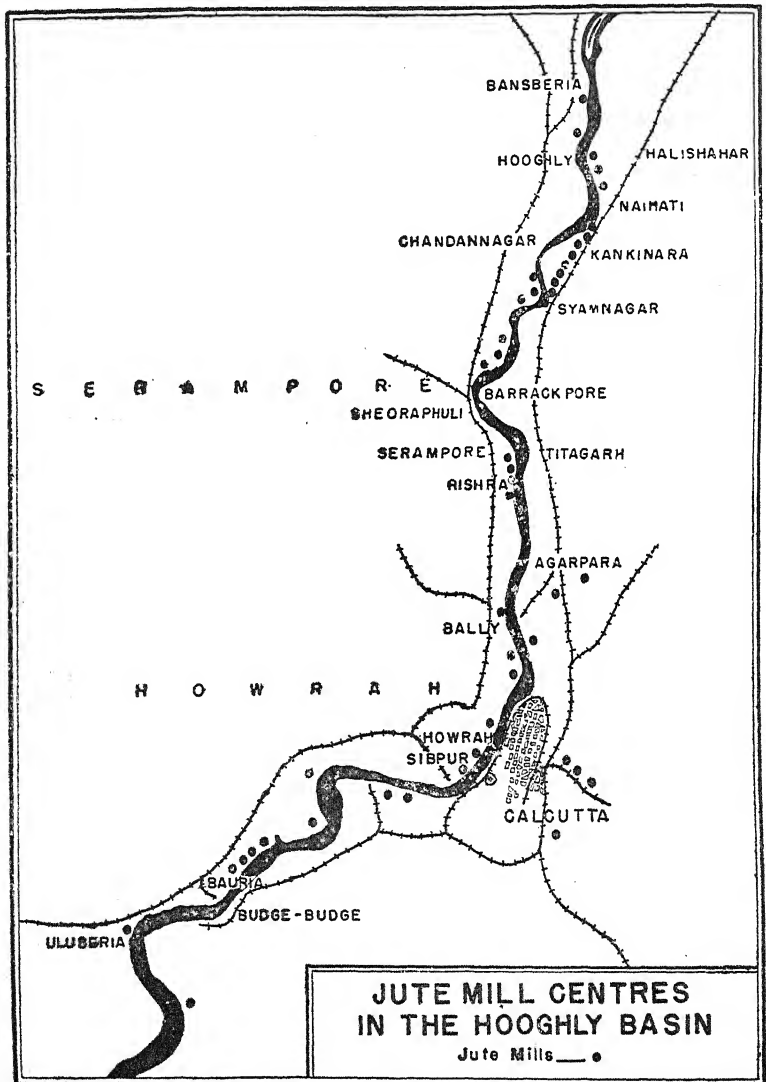


FIG. No. 56. All the jute mills of the Hooghly basin are within 40 miles of Calcutta.

bouring provinces of Bihar, Orissa and the Uttar Pradesh. At present more than 90 per cent. of the labour employed in jute mills comes from outside the province. Then again, the fact of Calcutta being a port makes the industry assured of supplies of imported machinery for mills.

The jute-mill workers are usually housed in dwellings provided by the mills at a nominal rent. These workers also enjoy free medical aid.

Calcutta itself is an important jute mill centre. The other centres are Bally, Agarpara, Rishra, Serampore, Syamnagar, Kakinara, Hooghly, Bansbaria, Ulubaria and Budge-Budge—all in the Hooghly basin and also within 40 miles of Calcutta.

There are four jute mills in the Madras State employing about 6,500 persons. Two of these are small units, the larger units being one in *Chitavalshah* and one in *Nellimarlla*. These two big factories account for about 77 per cent. of the total labour force employed in the jute mills in South India. Chitavalshah in the Bimlipatam taluk (Vizagapatam district) is a jute-growing village. Jute is grown in the vicinity, but because of its poor quality, only a small percentage of it is used by the factory, the rest being obtained from other areas. The jute mill at Nellimarlla (Vizagapatam district) employs about 2,000 workers.

In the Uttar Pradesh there are 3 mills located at *Kanpur* and *Sahjanwa*. Kanpur has two mills and employs 8,000 workers.

Indian jute mill industry consumes about 5 million bales of raw jute of which about 1·6 million bales must be imported now from Pakistan. Jute manufactures may be divided into four classes: (a) gunny bags, used for packing rice, wheat, sugar, oil-seeds, etc.; (b) gunny cloth or hessians; (c) coarse carpets and rugs; and (d) cordage. Fine and clean jute yarn of uniform size and quality is used in the cable industry. The jute mill production in 1952-53 was 920,000 tons. The jute products are mainly exported to the U.K., Germany, France, Italy, Egypt, South Africa, Australia, Java, Japan, Argentina, Canada, the U.S.A., Cuba and the Netherlands. The export of jute goods amounted to 730,000 tons in 1952-53.

PRODUCTION AND EXPORT OF JUTE MINUFACTURES (in 000 tons)

	Production	Export
Agerage 1936-39	1,165	1,004
1941	984	821
1943 ..	1,205	689
1945	1,000	677
1947-48 .	1,035	896
1948-49	1,081	872
1950-51	858	773
1952-53 .	920	730

The United States of America is at present the best customer of India's manufactured jute goods. She takes about 75 per cent. in volume of the annual exports of hessian cloth. In value she takes about 50 per cent. of the total exports of jute manufactures of all kinds. Argentina is the next largest customer of hessian cloth and takes about 10 per cent. The United Kingdom takes about 5 per cent. of the total exports of manufactured jute goods which include hessian cloth (ten per cent), hessian bag (thirty per cent.), gunny bags, sacking cloth and sand bags. Australia takes a large quantity of sacking bags for wheat and wool. There is a considerable demand for twills in Egypt, the Levant, South America and South and West Africa.

Jute—raw and manufactured—represents 50 per cent. of the total exports of Indian merchandise from Calcutta to foreign countries. The jute trade, raw and manufactured, represents 20 to 25 per cent. of exports from the whole of India, the highest figure recorded being 28 per cent. in 1929.

Between 1930 and 1939, Indian jute industry lost many of its foreign markets because of the introduction of substitutes and restrictions imposed on the free entry of jute. In Cuba, Ecuador and the Netherlands restrictions were imposed on the free entry of jute products. In Germany, Rumania and Lithuania the restrictions took the form of regulation of imports by licence. Germany also prohibited the use of jute sacks for coal and wool. It was a part of the Italian industrial programme to substitute jute by home-grown fibre.

The displacement of jute in many foreign countries has developed along two lines: (a) the use of grain elevators and other

mechanical appliances for the bulk handling of grain in countries like Australia, Canada and Argentina ; (b) the substitution of jute bags by bags of paper, cotton, sisal, hemp and other fibres. During World War II, when jute export was interrupted by the hostilities, many substitutes like cloth and paper bags became popular as packing materials and captured a part of the market. In other words, the progress of the jute substitutes was due to the scarcity of jute. New Zealand introduced *Phormium Tenax*—a vegetable fibre for domestic wool-packing industry. Russia and Argentina used *linseed fibre*. Canada, U.S.A., Sweden, South Africa and Australia widely used *cloth and paper bags*. If some of these substitutes are being used even now, it is because of the high price of jute in the post-war period.

The replacement of jute by processes of bulk handling is a permanent loss, but it is doubtful whether the substitutes of jute would compete ultimately with success. So long as the price of jute is kept within reasonable limits, there is no possibility of its being ousted from the international market by the substitutes. Apart from jute's competitive cheapness, the jute bags have a resale value ; they can be used time after time and therefore in the long run are cheaper. They can stand rough handling and bad weather. The problem of jute substitutes may be real—but not serious.* Therefore, the present and the future of the jute industry will depend entirely on obtaining raw jute at economic prices. Another factor that undoubtedly has some effect on the price of jute goods is the export duty.

It must be borne in mind that any increase or reduction in export of 'jute goods' is of very great significance. About a third of India's total foreign exchange earnings in 1948 came from jute and 66 per cent. of hard currency earnings had their origin from the same source. At present about 90 per cent. of the jute goods manufactured in India are exported.

* From the point of view of jute mills, it is necessary to make a distinction between *jute competitors and jute substitutes*. Jute competitors are those which cannot be produced on jute mills machinery, as for example, paper, cotton, sisal and coir. The jute substitutes, on the other hand, are those fabrics which could be readily spun or mixed with jute. Such substitute fibres may be natural or man-made. The natural substitute fibres are Manilla hemp, Caroa, bow-string hemp, Kenaf, Bimli Jute, Bombay hemp, Deccan hemp and Ambari. The first three are leaf fibres and the rest are bast fibres. There are today 50 possible substitutes which are fairly well-known.

Although markets may have been lost to competitive fabrics or in countries which are more and more tending to self-sufficiency, other new and valuable markets may be gained by research and experiment.

The Indian Central Jute Committee has a laboratory for technological research in Calcutta for finding out the new uses of jute other than its employment as a packing material.

*The new lines of manufacture**

Housing: Heat insulation; plastic furniture; carpets and curtains; upholstery; blankets; wall covering, etc.

Transport: Car upholstery; water-proof covers; tarpaulins; canvas; cordage and ropes.

Industry: Electric insulation; plastic reinforcement.

Clothes: Mercerized and bleached fibres blending with wool and cotton.

In many of these new lines of manufacture, the jute industry has already made good progress.

The Sugar Industry

Although India is the accredited birth-place of sugar-cane she had to depend on foreign sources for supply of her requirements of sugar up to 1931-32. The sugar industry of India has developed considerably since the grant of tariff protection in 1932.† She has now become the largest sugar-producing country in the world with an output far in excess of its present estimated annual requirements. There are 134 modern sugar factories in the Indian Union.

The industry is mainly confined to the Uttar Pradesh and Bihar which might be regarded as the sugar-belt of India. The important sugar-manufacturing centres in these two States are Kanpur, Gorakhpur, Lucknow, Allahabad, Champaran, Muzaffarpur and Bhagalpur. Other sugar centres are Coimbatore in Madras, Belapur in Bombay and Amritsar in East Punjab.

There are now 134 sugar factories in the country which annually produce a little more than 1 million tons of sugar.

* Barker—*Jute Industry*.

† The protection of the industry expired on March 31, 1950.

GEOGRAPHICAL DISTRIBUTION OF SUGAR FACTORIES (1949)

Provinces	No. of Factories	Production (tons)
Uttar Pradesh (U.P.)	65	5,27,000
Bihar . . .	29	1,84,000
East Punjab	1	9,700
Madras	9	51,000
Bombay	10	88,100
West Bengal	1	4,400
Orissa	1	3,400
Indian States .	18	1,32,400
	<hr/> 134 <hr/>	<hr/> 10,00,000 <hr/>

Production of sugar in India may be classified under three heads—(a) by modern factories working with cane, (b) by modern refineries working with *gur* and (c) by indigenous pan concerns which may be collectively called *Khandsaris*. Of these three methods of sugar manufacture, it is only the first that gives what may properly be called the white sugar of India, and it constitutes the most important section of the industry. The *gur*-refining industry as well as the *Khandsari* industry are very inefficient and wasteful. More than half the cane produced is used for the manufacture of *gur*.

The Indian Union produced 1·2 million tons of sugar in 1953 for which 10 million tons of sugarcane had to be crushed.*

As a result of the rapid development of the industry, the import of sugar has now practically disappeared and the country has been rendered absolutely independent of any foreign sources for the supply of sugar.

Judged by the standard of quality and grade, Indian sugar is now equal to that of Java.

* The other raw materials which are required in the production of sugar are limestone, sulphur, coal, coke and fire wood. For the production of 1 million tons of sugar, the industry consumes 6 million tons of fire wood, 100,000 tons of coal, 5,400 tons of sulphur and 8,500 tons of limestone.

In spite of such remarkable progress, there are certain drawbacks in the industry. The present weakness of the Indian sugar industry lies in the high cost of production which is due to (a) seasonal character of the industry, (b) defective methods of extracting juice from the cane, (c) great waste in refining, (d) poor output, and (e) the impossibility in most cases of concentrating cultivation round the central factory. These defects may be removed. But the Government and the industrialists should pay attention to research and modernisation.

In Java the factories for turning the cane into sugar are near the plantations and the process of manufacturing sugar is so developed that there is no loss of sucrose. Attention is also paid in Java to the production of by-products like rum and methylated spirit. The sugar factories in India have no control over the sugar-cane cultivation which is in the hands of ryots. These ryots possess small holdings of land and are not in a position to arrange for harvesting when the cane has reached maturity and is in the optimum condition. Moreover, in India sugar-cane areas are generally found at a great distance from the factories: as a result, the factories have to depend for their supply of the raw material on remote areas and thus to pay high costs.

The most important by-products of sugar is molasses which can be used for the manufacture of power alcohol and methylated spirit. So far the sugar industry of India has not given much attention towards this direction. Then again, bagasse which is the crushed cane after the removal of juice is used at present as fuel. Bagasse can be utilized for making wrapping paper and straw boards.

The sugar market in India is extremely elastic. The present high price of sugar has kept the market confined mainly to the rich and the middle class people. A little reduction in the price will bring the produce within the financial capacity of the poor. The Indian Tariff Board has recommended as a means of lowering the cost of production of sugar and expanding the industry: (1) shifting of factories in the U.P. and Bihar to more suitable localities; (2) *allocation of sufficient funds to the Indian Sugarcane Committee for carrying out its five-year plan of research and development and* (3) *fixation of sugar prices at a fair and reasonable level.*

The following figures will reveal the position of India as regards *per capita* sugar consumption in relation to other countries.

(in lbs.)

U.S.A.	.. 103	Australia	114
U.K.	112	New Zealand	115
Denmark	128	India	.. 24

Also due to high prices of Indian sugar, Pakistan and other Middle-East countries normally decline to import Indian sugar as they get sugar from Cuba and Brazil at cheaper rates. Sugar-cane accounts for 60 to 70 per cent. of cost of sugar. Sugar-cane cannot be cheaper unless there is more production of it, which can only be done by increasing the yield of cane per acre and also by improving the quality of cane. Any increase in the area of cultivation would conflict with the extension of areas under food or other crops which the country may need.

It will be observed from the figures given below how the factory prices of sugar soared high since 1938-39.

Year	Rs. per maund
1938-39	10 12
1944-45	16 4
1946-47	20 14
1947-48	23 7

The reduction in price will also help the industry to export the surplus production to Afghanistan, Tibet, Nepal, Burma, Ceylon and Pakistan. Pakistan can take more than 350 million lbs. of sugar from the Indian Union. The European countries can also be supplied with Indian sugar now that India produces a superior quality and higher grade of sugar equal to those of Java. India exported during 1952-53 about 86,000 tons of sugar as against 2,000 tons in 1950-51.

Sugar Industry in West Bengal

The position of West Bengal in the production of sugar is at present not satisfactory. West Bengal is a large sugar-consuming province in India, but she has only three sugar factories. The

present is, therefore, the most opportune time for starting more sugar mills. West Bengal enjoys certain natural and economic advantages for the cultivation of sugar-cane. In the U.P. and Bihar, the production of sugar-cane per acre is between 15 and 16 tons, while in West Bengal it is as much as 35 tons, sometimes 40 tons. The soil and climate of North-West Bengal and 24-Parganas are favourable to sugar-cane cultivation. West Bengal has also the advantage of a large local consuming market, economy in railway freight charges on finished goods is also an additional advantage for her over the U.P. and Bihar. As regards availability of cheaper power West Bengal stands in a very favourable position in comparison with the U.P. A very large coal-field lies near at hand and her excellent railway system and riverways bring this source of mechanical power at a cheap cost to the doors of the mills. But the great disadvantage of the Bengal sugar industry is that the port of Calcutta brings other sugar-producing countries within easy reach of Bengal market.

Tea Plantations

India is the second largest tea-producing country in the world. About 80 per cent. of the Indian tea is obtained from Assam and West Bengal. Southern India raises nearly 18 per cent. of the total output, the rest comes from East Punjab and Bihar. The production of tea in Northern India amounted to 463 million lbs. in 1949 and in Southern India to 105 million lbs.

There are more than 5,000 tea plantations in India, of which 50 per cent. is confined to the East Punjab and 20 per cent. to Assam. But the average size of a plantation in the Punjab is only 4 acres, whereas in Assam the average size exceeds 400 acres.

“Every garden of any importance has its own factories where tea is prepared for the market, as it is essential that the various processes should be carried through immediately after the leaf has been plucked. The better organised factories are elaborately equipped with highly specialised plant and are under the supervision of expert tea-makers.”

The Indian tea industry employs more than a million labourers, recruited mostly from the Uttar Pradesh, Bihar, Madhya Pradesh, Madras and Orissa. Assam employs in the tea-plantations more than half a million persons ; in West Bengal the number is a little

above 200,000. The question of labour is a difficult problem in Assam, where the local labour is generally unwilling to work in the plantations, because it finds in the cultivation of land a more easy occupation. Labour is employed in Assam on a contract system—the workers agreeing to remain at a stretch for certain years in a garden.

The second largest item in India's export trade is tea. Internal consumption of tea absorbs about 25 per cent. of the production, while the rest is available for export. The U.K., Canada, Australia, Egypt, the U.S.A., France and New Zealand are the chief buyers. The U.K. is the single largest buyer and takes as much as 60 per cent. of the export.* It is probably true to say that no other country in the world is so dependent on one consuming country for its prosperity. Although India is the greatest tea-exporting country in the world, several other countries like Ceylon, Java, Sumatra, China, Japan, Formosa and Indo-China produce tea and compete with India in European and American markets.

There is also a great scope for the expansion of the market for Indian tea in Iran, Egypt and the U.S.S.R.

PERCENTAGE OF INDIAN TEA IN THE TOTAL IMPORTS OF
TEA AND COFFEE IN CERTAIN COUNTRIES IN 1939-40

U.K.	60
Canada	56
U.S.A.	12
France	8
Australia	4
New Zealand	3

It is evident from the above figures that the competition is severe in the U.S.A., France, Australia and New Zealand. The U.S.A. and Canada favour the Ceylon type of tea which yields a flavoury liquor.

There is a great scope for development of internal market for Indian tea. *The Central Tea Board* is carrying on extensive propa-

* The supply of tea to the United Kingdom was once monopolised by China, but in 1840 India and in 1876 Ceylon, set out to break that monopoly and such success attended their efforts that in 1927, more than 83 per cent. of British needs of tea came from these two countries. [Vide *Empire Stock Taking* by Grondona (1930)].

ganda throughout India, as a result of which the demand for tea has increased considerably.* The Board claims that in Madras and Bombay more than 60 per cent. of the former drinkers *have become regular visitors to the tea shops*. The Board spends more than Rs. 20 lakhs on propaganda work in India.

The tea industry has had a continuous run of prosperity throughout the War years of 1939-1945 as the supplies of East Indies tea were cut off from the world market. The International Tea Committee had to raise the export quota of tea from India.

PRODUCTION OF TEA

	Million lbs
1938-39	452
1940-41	463
1941-42	470
1943-44	573
1948-49	532

In 1950, tea production in Indian Union was 567 million lbs. compared to world's total of 815 million lbs. In the same year the world demand for tea was to the extent of 848 million lbs. Hence the supply is still short of demand. Recently the Government of India has levied an export duty of As. 4 per lb. of tea. Till the production of tea is revived in Indonesia, Japan and Formosa, the export duty will not affect the tea trade.†

There has been a large increase of export of tea to Canada, U.S.A. and Australia from Indian Union. In 1952-53, India exported 424 million lbs. of tea of which the U.K. took 281 million lbs., U.S.A. 29 m. lbs., Canada 22 m. lbs., Australia 12 m. lbs. and Egypt 13 m. lbs.

The present problems of the Indian tea industry are (a) the acute shortage of chemical fertilizers, (b) shortage of plywood tea chests and (c) the deterioration in the quality of tea. Further progress of the tea industry will depend on the solution of these

* The intensive advertising campaigns initiated by the Board have already borne fruit in several countries; and apart from India and the United Kingdom itself, the potential markets in America, Egypt and South Africa offer a vast field for operations

† Although tea production has increased considerably, the internal consumption of tea has also increased. For this reason, further expansion in the export of tea will not be possible unless production is increased or domestic consumption is curtailed.

problems. It is also necessary to make more intense propaganda for Indian tea in foreign markets. Indian tea is losing grounds in U.S. markets because of its deterioration in quality and growing competition from other sources. *As tea is a good dollar earner, it is necessary to give immediate attention to this problem.* In 1952-53, U.S.A. took tea from India valued at Rs. 6 crores and Canada Rs. 4 crores.

The partition of the country gave rise to problems in regard to transport resulting in high costs. Calcutta's railway link with the tea-gardens ran through Pakistan territory and coal-supplies had to be sent through a new route involving motor transport over difficult hill roads. This increased the cost of manufacture. Now there is a direct railway link between West Bengal and Assam through Bihar.

The Silk Industry

The Indian silk industry was once in a very flourishing condition. During the sixteenth and seventeenth centuries, India, and more especially Bengal, occupied an important place in silk production and trade. The industry declined as the result of the competition of the silk yarn and silk piece-goods from Italy and Japan. In more recent years Chinese silk and artificial silk manufactures are competing severely with the silk-weaving and spinning industry in India.

India is a great raw silk producer. Various silkworms are reared in different parts of the country. The varieties are the mulberry silk, *tasar* silk, *endi* and *muga*.

There are three principal areas where raw silk is found: (i) southern portion of the Mysore plateau with the Coimbatore district of Madras, (ii) the Murshidabad, Malda and Birbhum districts of West Bengal, (iii) Kashmir and Jammu with the neighbouring districts of the East Punjab. There is also a considerable cultivation in Chotanagpur and Orissa and parts of the Madhya Pradesh of the *Tasar* silkworm and in Assam of the *Endi* and *Muga* silkworm. *Tasar* silk is also obtained from North Bihar where Bhagalpur is the chief centre of silk industry. Kashmir is the most important producer of silk in India where silkworms thrive best in the mulberry trees. Silk industry is a State monopoly there and the major portion of the products is exported to Europe.

The silk industry of India is an important national asset with strongly marked characteristics. It consists of two well-defined sections:

- (1) The production of cocoons ; and
- (2) The production of raw silk, including the utilization of by-products.

The first one is essentially a cottage industry, and the second is a factory industry.

SILK-PRODUCING AREAS IN INDIA

Name of area	Silk reeled lbs.	Name of area	Silk reeled lbs.
Mulberry Silk :		Tasar Silk :	
West Bengal	... 10,00,000	Bihar & Orissa	... 2,40,000
Mysore	... 7,40,000	M.P.	.. 1,60,000
Kashmir	... 2,32,000	U.P.	... 1,000
Madras	.. 90,000		
Assam	... 6,400	Total	... 4,01,000
East Punjab	... 1,000	Other Silk :	
		Assam Muga	... 1,00,000
		Assam Endi	... 50,000
Total	... 20,69,000	Grand Total	... 26,20,400

About 80,000 acres of land are under mulberry cultivation of which Madras has 20,000 acres and West Bengal 15,000 acres.

Silk manufacture is a cottage industry in India. The bulk of the raw silk produced in India is consumed by the handloom-weaving industry. Although there are 90 silk factories in the Indian Union, at present only three mills use power-driven looms for silk manufactures—one in Bengal, one in Mysore and one in Bombay.

The chief silk-weaving centres are Amritsar and Jullundhar in East Punjab ; Banaras, Mirzapur and Shahjahanpur in the U.P. ; Murshidabad, Bankura and Bishnupur in West Bengal ; Nagpur in M.P. ; Bhagalpur in Bihar ; Ahmedabad, Poona, Belgaum, Dharwar, Hubli and Sholapur in Bombay ; Bangalore in Mysore State ; Berhampur in Orissa ; Trichinopoly, Salem and Tanjore in Madras ; Srinagar in Kashmir.

Mysore silk industry produces more than two-fifths of the total output of silk manufactures in India.

The different districts of West Bengal specialise in manufacturing typical varieties of silk fabrics. *Sonamukhi* in Bankura and *Islampur* in Murshidabad made shirrings of various designs while *Bishnupur* in Bankura and *Murzapur* in Murshidabad specialise in dhoties and saris. The Bengalee weavers buy both foreign and Indian silk. The Indian variety is obtained in Bengal, Banaras and Surat. The foreign sources are Italy, Japan, France, U.S.A. and U.K.

In order to improve the condition of the silk industry in India it is necessary to have State support. The silk weavers are all poor and, therefore, cannot buy the necessary implements. They are also exploited by middlemen. These evils can be removed to a certain extent through co-operative society.

Though India is a large producer of silk, she has not been able to capture any foreign market. France and the United Kingdom import small quantities of raw silk. India exports cocoons, because reeling is so badly done that foreign countries prefer to do the reeling themselves. During 1952-53 India exported 712,000 lbs. of raw silk abroad. In the same year 140,000 yds. of silk piece goods were also exported.

Rayon or staple fibre is produced from wood-pulp by forcing viscose through minute holes to form filaments which are cut into short lengths or staples which can be spun on ordinary cotton machinery after a little adjustment. It is the generic term for manufactured textile fibre or yarn produced chemically from cellulose.

The present condition: India imports a large quantity of artificial silk from Italy, Japan, the U.K., France and other countries. The great demand for silk on the one hand, and the absence of any artificial silk industry in India on the other, indicate great possibilities. The necessary raw materials for artificial silk are available in India.

At present India imports rayon yarn for the purpose of manufacturing rayon piece-goods. There are about 300 mills in India for weaving rayon. In fact, the rayon industry has become second to cotton industry in importance. The main problem is the absence of rayon manufacture.*

* There are only three factories in India where rayon is manufactured—Travancore, Bombay and Hyderabad.

The Dehra Dun Forest Research Institute has observed that rayon can be manufactured in India from "fibro", a product obtained from grass and bamboo pulps. The forest wealth of Travancore and Mettur can be used for manufacture of "fibro" with the help of cheap power obtained from the Pallivasal Hydro-electric Project. Moreover, in India large quantities of cotton and cotton waste are available and this can be used in the artificial silk industry. "The percentage of yield of artificial silk from cotton is far greater than that from wood-pulp; wood-pulp yields 30 per cent. and cotton 85 per cent." The chemicals required are caustic soda, carbon disulphide, ammonium sulphate, white soap, bleaching liquid etc., which are mostly available in India. As plentiful supply of water free from chlorides is necessary, the industry should be localised on river banks having transport facilities.

There is demand for Indian rayon in Kuwait, Afghanistan, Pakistan, Ceylon and Sudan. During 1951-52 India exported 8.4 million yards of rayon piece-goods worth Rs. 1.1 crores.

The Woollen Industry. Indian wool is known in the world market as *East India Wools*. There are about 40 million sheep in India which are reared mostly in Northern India. The annual wool production is nearly 55 million lbs. Indian wool is short-stapled and is inferior to that of Europe and Australia. Raw wool is obtained from the Punjab, particularly the Hissar district, Garhwal, Almora and Nainital in the U.P., and Bikanir. Due to variations in climate and topographical conditions, the production of wool varies widely in different parts of India. Where the land is undeveloped and climate suitable, i.e., Rajasthan, sheep are kept in large flocks for wool production. In Bengal and Orissa, the industry is scarcely organised due to unfavourable climate which does not permit rearing of wool-weaving sheep. In South India the sheep have degenerated to such an extent that they bear fibre which is more akin to hair than wool. The first woollen mills were set up about 1876 at Kanpur and Dhariwal because of availability of cheap labour and water supply. In 1950, there were 39 woollen factories in India.

Indian wool is suitable for the manufacture of carpets and blankets which are made at Amritsar, Srinagar, Bangalore, Agra, Mirzapore and Kanpur. Shawl is a cottage industry product of

Kashmir. The finest wool comes from the Bikanir State and is used in the mills. Modern mills are mostly localised in Dhariwal and Kanpur. The mill-production is around 20 million lbs. a year.

For manufacture of worsted cloths in the few mills established in India, wool is chiefly imported from Australia. The average annual import of raw wool is of the order of 19·24 million lbs.

If proper care is taken to improve the sheep-breeding and to produce better and cleaner type of wool Indian Union can possibly become less dependent on foreign supplies.

The utilization of wool by Indian mills may be classified as follows:*

- (a) Indian plain wools—
 - (i) Coarse types: Blankets and carpets.
 - (ii) Finer types: Tweed, overcoatings, rugs, serge yarn.
- (b) Hill types—low grade hosiery and army blankets.
- (c) Cross-bred wools—Medium serge warps, worsted warps, tweeds, etc.
- (d) Merino wools—Flannel, overcoating and superfine broad cloths.

	<i>p.c.</i>
Blankets	49·6
Modern mills	28·7
Carpets	11·6
Yarn for sale	6·8
Other uses	3·3

A serious handicap from which the Indian woollen industry suffers is the fact that the season for wearing woollen cloths in India is about 4 months in a year, and the mills are to manufacture for many months in anticipation of a demand which may not be realised.

The woollen manufacturers of India have formed a Federation to avoid rivalry and competition among themselves. This Federation is known as the Federation of Woollen Manufacturers in India.

Indian wool is also exported outside. One important problem that confronts the export industry is that the quality of wool that is being sent outside is not properly graded. This has an adverse effect on the industry.

* Vide—Brochure on the marketing of wool in India (1948).

EXPORTS OF WOOLLEN GOODS

	1949-50	1950-51	1951-52	1952-53
Carpets and rugs (in million lb.)	10.4	14.0	11.6	7.1
Piece-goods (in yards)	31,887	21,225	63,788	37,041
Shawls (in number)	48,071	56,008	39,309	59,000
Other sorts of woollen manufactures (in million lb.)	1.3	1.5	1.2	1
Total value of all woollen goods (in crores of rupees)	3.6	6.0	6.49	3.27

The Iron and Steel Industry

Indian Union is the second leading iron and steel producing country in the British Commonwealth of Nations and yields place

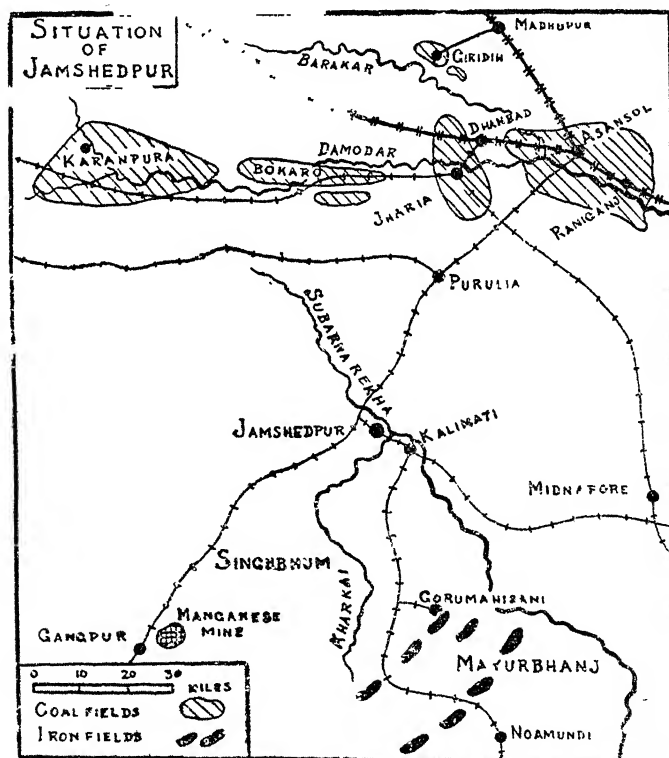


FIG. No. 57. The location of Jamshedpur with its sources of raw material supply. Notice the coal-fields in the north and the iron-fields in the south-east of Jamshedpur.

only to the United Kingdom. Although her output of iron ore cannot be compared with that of the U.S.A. and France, her reserves of ore are so vast that there is every hope that India will eventually take an important place among the producers of iron goods. The principal iron-ore deposits are found in Bihar, Orissa, Madhya Pradesh, Mysore and Madras. The most important iron belt extends from Gurumahisan in the Mayurbhanj State of Orissa through Kconjhar and Bonai to the Kalhan sub-division of Singhbhum. "Most valuable deposits occur in the chain of hills extending over 30 miles from Kompilai in the Bonai State to the neighbourhood of Gua in the Singhbhum district as in this area we get about 60 per cent. of the total deposits of this belt."

The value of an iron-ore deposit depends not only upon its richness in iron, but also upon its location and the ease or difficulty of obtaining raw materials which are required in the process of steel making. It is interesting to note that for one ton of steel, the following raw materials are required: coke 1.5 tons; iron ore 1.9; manganese 0.1; and dolomite 0.09. In India the various other metallic ores required in extracting iron from the ore are also available in abundance not far from the iron deposits. Manganese ore, for example, occurs in the Singhbhum district. Again, dolomite and limestone are found within a short distance of the ore-fields. The country is rather deficient in fluorspar, zinc and tin for galvanizing and tinning.

The iron and steel industry is now recognised as one of the biggest industries in India. It gives employment to nearly 35,000 persons. The first iron and steel company was started in 1875, but the real development began after 1908 when the Tata Company was established at Sakchi in the Singhbhum district. At present the companies chiefly engaged in the making of iron and steel are the following:

- (a) Tata Iron and Steel Co., Ltd.—It owns valuable iron-ore concessions in the Mayurbhanj State of Orissa and the Raipur district of the Madhya Pradesh, magnesite and chromite in Mysore and coal in the Jharia field.
- (b) Bengal Iron Co., Ltd., at Hirapur brings iron-ore from Pansira, Ajita and Maclettan mines.
- (c) Indian Iron and Steel Co., Ltd.—It manufactures pig iron, steel, ferro-manganese, etc., at Burnpur, near Asansol, 130 miles from Calcutta.

(d) Steel Corporation of Bengal brings iron from Keonjhar mines. The centre is at Monoharpur.

(e) Mysore Iron-works at Bhadravati.

It is not possible now for India to produce machinery, higher grade of cutlery, high-grade steel and rolling stock. She manu-

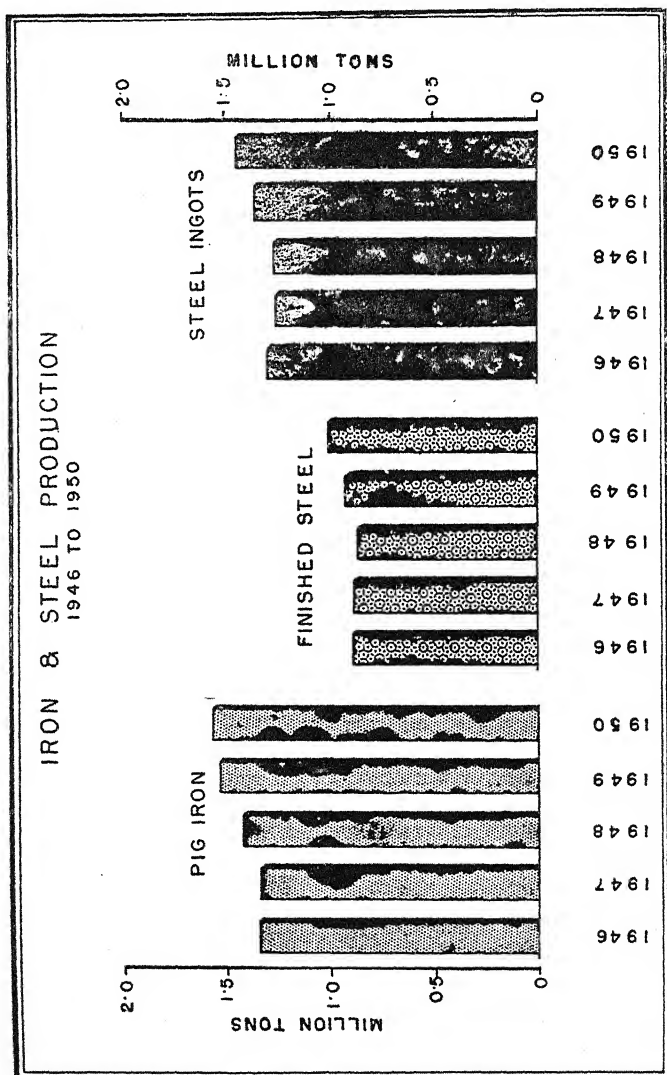


FIG. No. 58.

factures mainly pig iron, iron bars, steel tubes, tin plate, enamel wares, wires, nails, railway wagons, etc. India possesses unique advantages for the production of pig iron of which she is the cheapest large-scale producer in the world. The Tata Company also produces about 70 p.c. of India's pig iron. The Indian iron and steel industries are enjoying fiscal protection as manufacturers of basic materials.

India exports a large quantity of pig iron and steel manufactures. The bulk of the shipment goes from Calcutta. Madras also handles a considerable quantity. The chief markets for pig iron are the U.K., the U.S.A., Japan and China, while scrap iron and steel for re-manufacture go mainly to the U.K. and Japan.

PRODUCTION OF IRON AND STEEL IN INDIA

	(In 000 tons)			
	1938-39	1946-47	1948-49	1951-52
Pig iron	1,576	1,356	1,572	1,704
Casting	88	1,224	1,380	1,488
Steel ingots	977			
Semis	791	872	—	1,248
Finished steel	726	990	1,041	1,045

India's requirements for steel are estimated at 2.5 million tons a year of which only 1 million can be now produced in the country.

Jamshedpur, the centre of the Tata Iron and Steel Company, is the principal seat for the manufacture of steel in India. Jamshedpur is 156 miles west of Calcutta and is in the South Chotanagpur of Bihar. It owns valuable iron-ore concessions at Gurumahisani, only 50 miles away. Iron ore is also brought from Salaipat, Badampahar and Noamundi mines in Singhbhum. Coal is brought from the Jharia field, the distance being only 100 miles. Manganese is available in Malda, 30 miles south of Noamundi, Limestone and Dolomite are obtained from the neighbourhood, in Panposh on the Brahmani Valley in south-west Singhbhum. The centre is connected by railways and the cost of transportation is never high. Cheap labour is always available from Madhya Pradesh and Chotanagpur. The river Subarnarekha, though useless for navigation, supplies water to the industry. During summer this river dries up and, therefore, arrangements have been made to preserve water in the Kharkai river by constructing a dam.

PRODUCTION IN TATA IRON AND STEEL COMPANY

(In 000 tons)

	1947	1948
Coke	933	960
Pig iron	956	1,075
Steel ingots	901	1,029
Steel goods	644	753

About 41,000 people are employed in the steel industry of Jamshedpur.

The Eastern Railways (formerly parts of the Bengal-Nagpur Railway) with its branch lines, serves the industrial city for moving the raw materials and the finished products.

Burnpore is the second largest iron and steel centre in India. The city is 142 miles from Calcutta and the industry is managed by the Indian Iron and Steel Corporation Ltd. In 1936 the Bengal Iron Co., Ltd. was amalgamated with it. The centre manufactures iron for castings. It has a capacity of producing 20,000 tons of steel.

In Mysore the iron-ore deposits exist in the Bababudan hills and in the Shimoga district. The iron industry is located at *Bhadravati*. The forests of the Shimoga and Kadur districts supply charcoal for smelting iron ore. Limestone comes from Bhandigudda. Annually about 250 tons of steel castings for railways and various other industries are made at Bhadravati. The annual production capacity for finished steel is about 25,000 tons.

The prospects of setting up of an iron and steel industry in Madras are bright. The State has got in the districts of Salem and Trichinopoly an almost inexhaustible reserve of high grade iron-ore and other accessory ores required for the industry. The deficiency of coal is, no doubt, an impediment, but then charcoal is available and also hydro-electric energy. The auxiliary materials required for the iron and steel industry are fluxes and refractories. Both limestone and dolomite are available in the Salem district itself, as also in Trichinopoly and Coimbatore districts, while refractories, fire clay, magnesite, chromite and siliceous materials are found near iron-ore deposits.

The Second World War brought a run of continuous prosperity for the iron and steel industry. The industry has now doubled its pre-war output of finished steel. A large variety of

special steel like special bar for the manufacture of shells, bullet-proof armour plate, gun turrets, high grade steel machine tools and stainless steel for surgical instruments are being manufactured.

"The future outlook for the Indian iron and steel industry is bright. The immense natural resources of the country, particularly in comparison with those of some other eastern lands, its position of easy accessibility to the markets of the Indian and Pacific Oceans, the proved metallurgical skill of its iron masters and steel founders, and the commercial ability already displayed in the development of the export trade in pig iron—these, together with the great potential and growing home market for steel goods of every description, all presage expansion when world commerce returns to its normal channels."

Paper-Making in India

The manufacture of machine-made paper in India dates from 1867 when the first mill was established on the Hooghly. At present there are 18 mills in the Indian Union. The chief factors in the location of paper industry are (a) plentiful supplies of soft water, (b) nearness to fuel supplies, (c) nearness to chemical supplies, (d) nearness to paper-consuming areas, and (e) nearness to a port or trade centre where wood pulp and other grasses for pulp can be obtained.

Calcutta with its neighbourhood is the principal centre of the paper industry in the Indian Union. The other centres are Lucknow, Bombay, Punalur (Travancore), Saharanpore and Poona.

NUMBER OF PAPER MILLS AND THEIR CENTRES

Provinces	No. of mills	Centres
West Bengal .	. 4	Kankinara, Titagarh, Ranigunj and Naihati.
Bombay .	. 3	Bombay, Poona and Ahmedabad.
Uttar Pradesh	2	Lucknow, Saharanpur.
Bihar .	. 1	Dalmianagar.
Orissa .	.. 1	Brajrajnagar (Sambalpur dist.).
East Punjab	. 1	Jagadhri (Ambala district).
Mysore ...	.. 1	Bhadravati.
Travancore .	... 1	Punalur.
Hyderabad .	... 1	Sirpur.
Madras .	.. 1	Rajamundri (East Godavari).

The Bengal mills are the largest in India and at one time accounted for about 80 per cent. of the country's production. The paper mills in West Bengal use bamboo and Sabai grass for pulp. Sabai grass is obtained from M.P. and Berar while bamboo from Assam and the State itself. In 1950, the West Bengal paper mills employed about 10,000 workers.

In Bombay, the largest mill is at Poona. The mill at Bombay city produces card board etc.

The Indian paper industry gives employment to more than 10,000 people. At present Sabai grass and bamboo are the principal raw materials for paper manufacture in India. Wood pulp constitutes only 10 per cent. of the total raw material. In Europe and America, coniferous wood is used for pulp. In India forests of coniferous trees—pine, spruce and fir—are available in the Himalayas, but it is not possible to exploit them commercially on account of the lack of transport facilities. There are possibilities, however, for using pine wood of the Kashmir State for the manufacture of pulp. The Dehra Dun Forest Research Institute is making experiments with *Bagasee*. Sabai grass, which grows abundantly in Northern India, is now used for making pulp in East Punjab and U.P. For cheaper varieties, rag, hemp, jute waste and waste paper are used. Bamboo pulp is used only in Naihati, Bengal.

The supplies of bamboo in areas where the other conditions are favourable for its exploitation are sufficient to meet the needs of all the paper mills in India and leave a surplus from which an export trade in pulp can be developed. It grows extensively in Assam, Madras and Bombay. The advantage of bamboo is that the cutting rotation is on average four years as against 60 years in the case of wood. Further, the dead bamboo stems remain suitable for the manufacture of pulp for at least 4 years. Its yield is larger than sabai grass and cost cheaper. Of course, as a raw material, bamboo is inferior to sabai grass; but, in India, the demand for superior quality paper is limited. The prospect of the bamboo paper-pulp industry is, therefore, quite bright.

The paper industry of India is working under certain disadvantages. The necessary chemicals, like caustic soda, soda ash, salt cake, bleaching powder and dyes, are to be imported from abroad at high prices. Moreover, these chemicals are to be

brought to the mill-centres from the ports, and the transport charges are heavy. The problem of power is no less acute. Most of the mills are to pay heavy charges for coal as the best coalfields are mostly confined to the Damodar basin of Bihar-Bengal. The total quantity of paper of all kinds imported by India before the war was 2·5 million cwts. The question of foreign competition, however, need not be taken seriously. Norway and Sweden can never afford to dump paper into India as these countries manufacture paper mostly for foreign markets. Dumping is possible when the domestic consumption is adequate enough to make good the loss.

It is not possible to make newsprint in India with grass or bamboo-pulp. At present India is wholly dependent for newsprint on imports from foreign countries. The establishment of a newsprint industry in India is a vital national necessity. Experiments show that newsprint can be manufactured in India from the Indian spruce, paper mulberry and pula. Indian spruce occurs in the hills of East Punjab, the U. P. and Kashmir. But owing to wartime fellings in the accessible areas, the wood is not available in regions where cost of extraction will prove to be economical. Paper mulberry species grows very fast and thrives in tropical climates. It attains to a pulp-wood size in 7 to 10 years of growth in natural course as against 60 to 70 years in the case of spruce and fir. Paper-making tests with this pulp were carried out by the Forest Research Institute of Dehra Dun and it was found that the strength characteristics of the newsprint were more or less equal to those of the sample of the imported newsprint. It is expected that the production of newsprint in India will soon begin on a commercial scale.

The types of paper manufactured in India are white and unbleached printing other than news printing (30%), writing paper and envelopes (13%), packing papers (18%), pulp boards (11%), coloured printing other than news printing, Badami, blotting and Manilla. Expensive rag papers, art paper, blue match paper, etc. are not likely to be made in India in near future. Recently, however, a mill for the production of tissue paper has been founded at Tribeni, Hooghly. A newsprint factory is being set up in Madhya Pradesh. Other ideal places for the location of mills for the manufacture of newsprint are Kashmir, Hyderabad and Tehri Garhwal State.

India imports paper from U. K., Norway, Sweden, Germany, Japan and Holland. About one-fourth of the imports comes from U. K.

With the outbreak of the Second World War, imports from these countries ceased and Indian paper-mill industry got an excellent opportunity of expanding and consolidating its position. The growth of the paper industry in India will be evident from the fact that within 20 years the production has gone up to 123,000 tons in 1951-52 from about 55,000 tons in 1933.

Although the paper industry has increased its production considerably, the output is not yet adequate to meet the entire requirements of the country. The demand has, therefore, increased for hand-made paper as well.

It is expected that, in course of time, Indian paper industry will supply the entire requirement of India and will also be in a position to export paper outside. The possibilities of export are in the direction of Burma, Ceylon, Malaya and East Africa where at present there are no paper mills.

Chemical Industry

The Indian Union has now 35 chemical factories. The chemical industry has made enormous progress during the last few years. The range of manufactured products has greatly increased, and besides factories of basic products, raw materials for agriculture and industry, the Indian chemical industry manufactures many articles for direct consumption.

Chemical industry supplies materials which are used in other industries or agriculture. The production of soap, leather, glass, paints and varnish, drugs, rubber, etc., requires chemicals without which they cannot be manufactured.

The chemical industry can be divided into:

- (a) Heavy chemicals;
- (b) Coal-tar chemicals;
- (c) Electro-chemicals.

Heavy chemicals include mainly sulphur and its compounds, acid hydrochloric, soda ash, caustic soda and fertilizers. The importance of heavy chemicals lies in the fact of their being essential for other industries like textiles, leather, paper, etc., and their consumption depends on the activity of those industries.

The second World War was responsible for the birth of a heavy chemical industry in India. The curtailment of imports, the shortage of shipping facilities and the consequent demand for increased local production of different types of chemical goods provided ample cause for an accelerated tempo in the development of chemical industry. At present several types of heavy chemicals are manufactured in Bombay, Calcutta, Delhi, Kanpur, Amritsar, Madras and Bangalore, but the production is not sufficient to meet the requirements of the country. India's sources of raw materials for heavy chemicals are not deficient if only the various mineral ores are properly treated. Salt, limestone, gypsum, bauxite, zircon, ilmenite, beryl, monazite, kaolin, etc., are found in abundance. In regard to fuel, the problem is very serious, because except Bengal, cheap coal is not available in other centres like Delhi, Madras, Bombay and Bangalore. The present hydro-electric schemes of the South need further expansion for supplying cheap electric power. The chemical plants, which are regarded as essential for building chemical industries, are not made in India, but if proper attempts are made, much of the simpler plants could be locally manufactured.

Coal tar is the foundation of the organic chemical industry from which benzole, anthracene and anthracene oil are obtained for use in dyes, explosives, flavouring essences, perfumes, plastics, pharmaceutical and photographic chemicals. Coal tar production and its distillation are centralised in Calcutta, Kulti, Jamshedpur, Bombay, Jharia and Hirapur. The Electro-chemical industry is of recent origin in India. Among the many products, the chief are calcium carbide, aluminium, magnesium and ferro-manganese. In many of these industries, electrical energy forms the major portion of the cost of the product, success or otherwise of the industry being largely dependent on the rate at which power is made available to the industry. With the completion of hydro-electric projects now under construction, abundant power will become available and it will be possible to establish many electro-chemical industries in Bengal, Bombay, Madras, Bihar, Mysore and U.P.

The steady growth of Indian chemical industry can be observed from the fact that in 1952-53, India imported chemicals of the value of Rs. 13 crores as against Rs. 30 crores in 1949. The imported chemicals consist of sodium compounds, sodium carbo-

nate, caustic soda, acids, potassium compounds, sulphur, bleaching powder and glycerine.

SHARES OF THE PRINCIPAL SUPPLYING COUNTRIES IN THE
TOTAL IMPORTS OF CHEMICALS IN INDIA

<i>Per cent.</i>			<i>Per cent.</i>		
U.K.	..	.. 60	Italy	.	... 5
Germany		... 8	France		... 8
U.S.A.	..	... 12	Japan	.	.. 5

Glass Industry

Glass manufacture has been known in India since time immemorial. Crude glassware and ornaments have been found dating back to the early centuries A.D. In the 16th century there was an established glass industry in India which produced bangles and small bottles. The credit for the growth of glass industry on modern lines in India goes to the oldest factory at Bombay which was started in 1908 as a result of the Swadeshi movement. One Mr. A. D. Kale collected a few thousands from the masses collecting one pice from each contributor and started the Paise Fund Glass Works at Telegaon with the help of certain political leaders.* But it assumed the character of a modern industry with the outbreak of the War of 1914-18, when Indian manufacturers made considerable efforts to fill the partial void created by the stoppage of imports from Czechoslovakia, Belgium, England and Germany.

It has a wide geographical distribution in India. There are 131 glass and glassware factories scattered all over the country giving employment to more than ten thousand people. In addition there are 93 factories for making bangles and pearls. Though it is a very old industry, its development has been comparatively very tardy. With the end of the war of 1914-18, the foreign competition reasserted itself. With a view to protecting the indigenous industry the Government imposed an import duty of 30 per cent. on glass bangles and 15 per cent. on glasswares. The duty was further increased in 1931. By 1932 there were 59 factories. Thereafter the number of factories continued to

* Report on the labour conditions in the glass industry by B. P. Adarkar (1949).

increase. The distribution of glass factories in 1950 was as follows:

Uttar Pradesh	24	Madhya Pradesh	..	6	
West Bengal	..	34	Madras	.	4
Bombay	.	32	Delhi		3
Bihar	.	8	Orissa		1
East Punjab	.	7	States	.	12

The industry is carried on under two systems: (a) the indigenous cottage industry, and (b) the modern factory industry.

The indigenous glass industry is spread all over India, but the chief areas are the Firozabad district of the Uttar Pradesh and the Belgaum district of Bombay. Similar types of cottage industry also exist in Mysore. Bangles are mostly made at Firozabad. It supplies nearly onethird of the country's demand. So complete is the concentration of the bangle industry at Firozabad that practically no bangles other than the *indigenous des* bangle of the cottage workers are made elsewhere in India. The industry is, however, decentralised at Firozabad and all the processes are carried on in cottage shops employing 5 to 35 persons in each. The indigenous glass industry had to face competition from the factory industry which started manufacturing the rough type of bangles in competition. On the top of this, the competition from Japanese manufactures in bangles and other ornamental types was there. As a result the cottage industry is today restricted to the rough products and on a smaller scale.

The modern factory industry is more or less restricted to the production of the following classes of goods:

- (1) Glass cakes for bangles;
- (2) Beads, bottles, lampware, phials, tableware, etc.;
- (3) Sheets and plate glass on a limited scale;
- (4) Surgical and laboratory requirements in glass in special cases.

The Uttar Pradesh, Bombay and West Bengal are the three main provinces for glass factories.

Glass industry has developed to a considerable extent in the Uttar Pradesh where 74 factories manufacture bangles, hollow and pressed wares, glass sheets, etc. *Bahjoi* in the district of Moradabad is the only glass-sheet making centre in India.

Although the average annual demand for sheet glass is to the extent of about 39 million square feet, its production in the country in 1950-51 was 9.6 million square feet. The overseas competition has necessitated the fixing of maximum import of sheet glass. The five year plan has fixed the target production at 7 times the present production. Hollow and pressed wares like motor head-lights, reflectors, bulbs, chimneys, etc., are produced in Shikohabad, Hathras, Naini and Bahjoi. The factors that lead to the success of the glass industry are the availability of sand, potash, nitrate and lime in the province itself. Coal is imported from Bihar and West Bengal. There are, however, certain drawbacks in the glass industry of U.P. The designs of bangles and glasswares are all old-fashioned and are mostly imitations of the Japanese brand or Moradabad brass-wares. The industry is in the hands of small dealers, and as such it is not properly organised.

Lamp wares, bottles, glass tubes, flasks, beakers, test tubes, plate glass, etc., are mostly made in Bengal and Bombay. There are 32 glass factories in Bombay, employing about 4,500 workers. In East Punjab, the principal centre of industry is Amritsar with its four glass factories. These factories produce mostly bottles. There is also one factory at Ambala which produces both scientific goods and hollow ware.

The most commonly used raw materials are sand, borax, soda ash, salt cake, dolomite, limestone, saltpetre, sulphur, manganese dioxide and colouring materials. Sand which is required in bulk is available in the various parts of the country with varying quality. Borax is not now found in India and has, therefore, to be imported from U.K. and U.S.A. There are abundant supplies of good quality dolomite, saltpetre and limestone in the country. The other raw materials like sulphur, manganese dioxide and colouring materials are imported. The main difficulty of the Indian glass industry today is the procurement of soda ash which is now partly imported and partly obtained from the Indian soda ash factories.

The future of the glass industry is indeed bright. The home market is fairly large and many of the raw materials are found in large quantities. The Indian glass industry is in a position to export glass and glassware to foreign countries like Aden, Bahrain Island, Ceylon, Burma, Malaya, Arabia, Iran, Afghanistan, Indonesia and Indo-China.

Aluminium Industry

India possesses large reserves of bauxite suitable for the manufacture of aluminium.* Deposits of bauxite are available in Madhya Pradesh, Orissa, Bihar, Madras, Kolhapur, Bombay, Jammu and Kashmir.

The other raw materials required in the production of aluminium are coal, caustic soda, cryolite, fluorspar, pitch and aluminium fluoride. About 4.5 lacs of bauxite, 4 tons of coal, 20,000 Kw. of electric energy are required in the production of 1 ton of aluminium. Thus availability of power is an important factor in the localisation of aluminium industry.

Aluminium has recently assumed great importance as a metal because of its lightness, corrosion-resistance, electrical conductivity and ease of fabrication. The metal is used in transport, chemical, brewery and food industries, building and architecture, insulation and paints. The aircraft industry is entirely dependent on the use of aluminium alloys. The metal is also used for bus bodies and railway coaches. Aluminium vessels are much more suitable for use in the kitchen than those of other metals. Aluminium containers are also replacing containers of tin plates.

PROGRESS OF ALUMINIUM PRODUCTION IN INDIA

Year	Production (tons)	Year	Production (tons)
1948	3,367	1951	.. 3,489
1949	3,491		
1950	3,591	1952	... 3,941

The aluminium industry is located at *Alwaye in Travancore, Belur and Asansol in West Bengal and Muree in Bihar.*† The aluminium work of Alwaye has a capacity of 2,500 tons a year and uses hydel power from the Pallivasal Scheme. A new aluminium centre is being opened near Katni in Madhya Pradesh. The annual production is about 4,000 tons. The cost of production is

* The Planning Commission has estimated that the total reserves of good bauxite are between 20 to 35 million tons, sufficient to last for over 100 years with an annual production of 50,000 tons of aluminium.

† At present India has only two companies for aluminium production: The Indian Aluminium Company Ltd. and the Aluminium Corporation of India Ltd.

very high. The imported metal, however, does not very much compete with Indian production. India imports annually about 7,000 tons of aluminium goods.

Leather Industry

The main factors for the location of leather industry are the following: (a) plentiful supplies of hides and skins; (b) plentiful supplies of good water; (c) nearness to chemical supplies; and (d) good supplies of tanning materials. Indian leather industry can be divided into two categories—(a) indigenous and (b) modern.

The indigenous process is employed for crude leather, sole leather and half-tanned leather. A varam or turwar bark (*Caussia Auriculate*) is generally used for tanning though the use of wattle bark is not uncommon in Madras. The indigenous tanning is done by the *Chamars*.

Modern tanning uses *babul* bark and myrobalans in dealing with hides. Such processes have been introduced in Kanpur, Agra, Calcutta, Delhi and Madras. Batanagar, near Calcutta, makes footwears on a large scale. At present large quantities of wattle bark from East Africa are used in India for tanning purposes as the supply of babul bark is not adequate. Chrome process has been recently introduced in India and Madras has done much pioneering work in this direction.

Hides (the skins of the larger animals) and skins (the skins of the smaller animals) are the chief raw materials of leather industry. India is the world's major supplier of raw and half-tanned hides and skins. She produces annually about 20 million cattle and $3\frac{1}{2}$ million buffalo hides, 22 million goat and kid skins and 3 million sheepskins. In the production of cattle hides, India stands first in the world. In 1948-49, the Indian Union produced 979,000 buffalo hides and 1,087,000 cow hides in organised units.

About 60 per cent. of the raw hides and 40 per cent. of the goat and sheep skins are tanned in India and the remainder is exported raw. In 1952-53 India exported 14,000 tons raw hides and skins worth Rs. 517 lakhs, while exports of tanned leather were 467,000 cwt. The United Kingdom alone takes about 50 per cent. of the Indian exports of hides and skins, the U.S.A. coming second with about 30 per cent.

India supplies about 30 per cent. of the goatskins of the world. The Indian goatskins are considered to be the best raw materials for high class kid. U.S.A., Czechoslovakia and U.K. are the chief buyers. The export of lamb and kid for skins is an interesting development of recent years. In future, India's fur-skins will play a very useful part in international commerce.

The term *tanning* is generally used to cover a variety of processes which convert hides and skins into leather. The principal tanning materials are (a) vegetable tanning materials, (b) mineral tanning agents, (c) oils. Vegetable tanning materials are obtained by water extraction of certain parts of various plants which contain water soluble known as tanning or tannic acid. The parts used may be wood, bark, leaves or skin of fruit. Aluminium and chromium are the chief mineral tanning agents. Aluminium is used with fatty matters, such as egg-yolk, olive oil and the gluten of flour. The chromium is used in the form of chromium sulphate. For heavy leather tanning, cod, herring, seal or whale oil is used.

During the Second World War the industry received considerable fillip due to large military demands for boots and shoes, harness, saddlery and other army equipment. The Uttar Pradesh was the largest producer of army boots and shoes in the British Empire. From the pre-war production of 40 lakh pair of shoes in 1938-39, the country during War produced more than 85 lakh pair of shoes. The output of harness, saddlery etc. can be valued at Rs. 22 crores a year. The output of leather increased by more than seven times. Such a large increase in the supply of leather was made possible by the increased slaughter of cattle to provide meat for the defence forces. This increased slaughter of animals brought in its wake the problem of scarcity of milk supply in urban areas.

The Ship-building Industry*

The necessary requisites for the ship-building industry are:

- (i) Ship-building and repairing yards,
- (ii) Deep water in the harbour,
- (iii) Proximity of raw materials,
- (iv) Supply of labour.

* In the past India had a very flourishing shipbuilding industry dating from 1500 B.C. Even in the 18th century, Indian shipping was very progressive. The introduction of steel coupled with the fact of India's loss of independence, gave a death blow to Indian shipbuilding industry.

In Calcutta and Visakhapatnam there are already certain repairing yards for making hulls and lighter crafts. Calcutta also boasts of a few dry docks. The Gondwana coalfields are connected by railways with Calcutta and Vizagapatam. Though India is fairly rich in iron ore and there are four important steel manufacturing centres in India which can supply ship-building materials, yet in the initial stage, engines, propellers and other machinery will have to be imported from abroad.

It is interesting to examine the suitability of Visakhapatnam as a ship-building centre. The situation of the harbour at the centre of the eastern coast between Calcutta and Madras offers great facilities for bringing down the necessary materials from the hinterland of those two big ports. Visakhapatnam has the additional advantage of possessing a deep-water harbour which permits the launching of big ship. The tidal range is also satisfactory. Steel, the most important raw material, can be brought to the shipping yard from Tatanagar, 550 miles away, by the B. N. Rly.—now part of the Eastern Railway. The Gondwana coalfields are also within easy reach. Timber, necessary for making decks, cabins etc., can be had from Chotanagpur. If railway lines are constructed to connect Waltair with the actual shipyard, the cost of transport in bringing raw materials will be further reduced. The local manpower is cheap and seems to be suitable for modern technique, if properly trained. Thus the Vizagapatam ship-yard may become, in future, a very good ship-building base and may build ships at internationally competitive prices.

The Scindhia Steam Navigation Company opened in 1941 a ship-building yard at Visakhapatnam.* The building of medium-sized ocean-going vessels has already begun at Visakhapatnam. In 1948 one 8,000 tonner was turned out from this yard.

The other major ports of India, like Bombay and Madras, cannot conveniently develop the ship-building industry. Bombay is many hundred miles away from the coal and iron fields. The harbour of Madras is artificial and the sea is shallow. Therefore, big sea-going steamers cannot be launched. The backwater at Cochin provides an excellent harbour and a yard for special repair-

* In 1952, the Hindusthan Shipyard took over the Visakhapatnam yard from the Scindhia Company. In the Hindusthan Ltd. the India Government has two-thirds capital and the remaining one-third is that of the Scindhia.

work. The most ideal sites near Calcutta are Uluberia and Rajganj because better depths of water are available here. As a ship-building centre, Calcutta has the advantage of being near the source of raw material supply and in the midst of a highly developed mechanical engineering industry.

The great problem of the ship-building industry is the shortage of ship-building plates in the country. Efforts are being made to meet the requirements for new construction of deep-sea-going vessels.

Recently a small ship-building yard project has been launched near *Bhatkal* in Bombay State.

Aircraft Manufacture

The possibilities of an aircraft industry in India are very promising. Apart from the requirements of military aircraft, India, with its long distances and excellent visibility, has vast possibilities of civil aviation.

The Indian Union has now more than 40 air service routes covering about 14,000 route-miles. There are now 16 daily services and 42 weekly services.

In the initial stage of its development, the Government should help the industry to procure machinery and raw materials from abroad and also ensure a certain market by placing substantial orders. In 1939, the Government of India turned down the scheme of the Scindhia Steam Navigation Company for the manufacture of aircrafts in India as "impossible". As a result of the changing course of the war, however, the Government declared in 1940 that "it was Government's intention to proceed with the scheme as soon as the necessary plants and materials became available." An air-craft factory was floated in Bangalore in 1941. This factory has now been taken over by the Government and is engaged in the repairing and production of areoplanes.*

Bangalore, in Mysore State, is an ideal place for aircraft manufacture. The advantages of this centre are the availability

* The name of the company is the Hindusthan Aircraft Factory. The work consists of assemblage of aircraft from imported components and the manufacture from raw materials under an *assistance arrangement* with Messrs. Percival Aircraft Co. of England.

of cheap electric power, equable climate, central situation and remoteness from the sea-coast, existence of the Science Institute and the proximity of an iron factory. Jamshedpur is also a potential site for the manufacture of aircrafts.

Automobile Industry

There are fair prospects for the development of an automobile industry in India. The average annual import of motor cars, omnibuses and parts exceeds Rs. 6 crores. The estimated number of vehicles in use in India is 2,50,000 as compared with 30 million in the U.S.A., $2\frac{1}{2}$ million in the U. K., 2 million in France and $1\frac{1}{2}$ million in Canada.

AVERAGE NUMBER OF PERSONS SERVED BY ONE MOTOR CAR IN SOME COUNTRIES

U.S.A.	4	France	18
Canada	8		
U.K.	18	India	1,900

Recently several companies have floated assembly plants in Calcutta, Bombay, Madras. India has already established seven plants—3 in Bombay, 1 in Madras, 2 in Calcutta and 1 in Okha—for complete assemblage of cars and trucks from knocked down condition. *The Calcutta Centre* was started in 1944 by the Hindusthan Motors Ltd. The Company has plants to manufacture complete trucks and motor cars (with the exception of body) and is linked up with Morris Motors, England and 'Studebaker' of U.S.A. for the manufacture of 'Hindusthan' and 'Studebaker' cars in India. A well-equipped factory is being built up at Uttarpara, Calcutta, for assemblage work. *The Bombay Centre* was also started in 1944 by Premier Automobiles Ltd. This company is linked with Chrysler Group of U.S.A. and manufactures cars and trucks. During 1947-48, about 22,000 cars and trucks were assembled in the Indian Union. The other sites of the industry may be at Burnpore and Jamshedpore which, besides being near or in the heart of iron areas, can conveniently use imported machines and parts. As these three centres are already noted for engineering

industries, the supply of trained labour and various parts for the automobile industry will be available.

Essentially the automobile industry is a component construction and assembly business. So, India need not produce all the parts and accessories used in building up automobiles. Nowhere in the world an automobile manufacturing plant is self-sufficient in every way. India too while manufacturing most of the parts necessary can import some parts and there need be no qualms about them. The automobile industry of India is likely to manufacture 75 per-cent. of the component parts of cars in India itself by 1956. At present only 83 parts are manufactured in India for building automobiles. The existing units in the automobile industry have long-term production plans which when fulfilled will meet the entire demand for cars and trucks.

There are certain problems which stand in the way of the Indian automobile industry. The sales of Indian cars are affected greatly by import of used cars from abroad. The introduction of diesel trucks of foreign make in several areas in the Government Transport Departments has also restricted the field for the Indian truck manufacturers. This is of great importance because the Government is also an important buyer of Indian cars. Then again, the present road facilities are far from satisfactory. If more roads are built, the market for Indian cars will also expand.

Lac Industry

The name 'lac' is derived from the Sanskrit word "Laksha" meaning hundred thousand referring, no doubt, to the innumerable insects that take part in secreting resin.

Lac is virtually a monopoly of India and is grown chiefly in Chotanagpur, Orissa and the Madhya Pradesh. These areas produce about 85 per cent. of the total production. Chotanagpur alone being responsible for 50 per cent. of the total. The annual production of lac is about 1 million cwt. *In its refined form, in which it is usually packed for export, it is known as shellac.*

The insect which produces lac is known as *Laccifer lacca*. It lives as a parasite feeding on the sap-juices of certain trees like Palas, Kusum, Ber, Kahir, Ghont and Arhar.

Lac yields two products—dye and resin. Lac dye trades are no longer important because of the discovery of the aniline dyes. It is now the resin for which lac is important.

Lac is used in a variety of industries. Between thirty and forty per cent. of the total lac is consumed by the gramophone records industry; another thirty-five per cent. is utilised by the electrical, paint and varnish industries. Lac is also used in sealing-wax manufacture, photographic materials, the confectionary trade, bangles, toys, shoes, dressings, micanite, grinding stones and munitions and fireworks.

About 97 per cent. of the lac produced in India is exported to the United States of America, England, Germany and Japan. America alone takes about 30 per cent. of the total production.

EXPORT OF LAC TO FOREIGN COUNTRIES IN CWT.

		1938	1952-53
U. K.	..	... 125,475	97,000
U. S. A.	..	.. 257,937	360,000
Germany	.	. 64,373	10,000
Japan	..	. 18,729	20,000
France	..	. 11,460	13,000
			<hr/>
		Total	686,000

Although lac is a virtual monopoly of India, its position is by no means secure because of the introduction of synthetic products in foreign countries. Bakelite is now largely used in the electrical trade. In the varnish trade, cellulose preparations are common.

Before the last War, India produced 90 per cent. of the world's supply of lac. The remaining 10 per cent. was produced in Siam, Indo-China and Burma. The refining of raw lac into shellac and seedlac was, however, the sole monopoly of India as the other producing countries sent their raw lac to India for processing.

Siam is now not only producing more lac but is also refining it into shellac for direct export to the U.S.A. and other foreign countries. Against a pre-war average annual export of 5,000 tons of sticklac (mostly to India) from Siam, about 10,000 tons of sticklac and 1,500 tons of shellac were exported from Bangkok

during the first nine months of 1947 alone. This is equivalent to about 25 per cent. of India's total production. There is improvement in the quality of the Siamese shellac and with all that its price is about two-thirds that of Indian shellac. Shellac factories have been started in Siam for an annual output of 6,000 tons of shellac. This is about one-third of India's production.

The Indian Lac Research Institute was established in 1925 at Namkum near Ranchi with a view to devising improved methods of cultivation, improving the quality of lac, finding new uses for shellac and organising research in consuming countries in co-operation with the industries using lac.

The most deplorable fact about the shellac industry is that no attempt has hitherto been made to utilise it in India on a commercial basis.

Recently the London Shellac Research Bureau (controlled by the Indian Lac Cess Committee) has developed lac-oil varnishes. During 1939-45 the new uses of lac for road paints, anti-gas paints, luminous paint, shellac bitumen, spirit paint, quick-setting cements and rapid drying varnishes for mineral oil and petrol containers were discovered.

The Cement Industry

Cement is a specially prepared material which is used as a binder for stones and brick masonry or as a matrix in the production of concrete. The Indian Cement Industry consists of 21 factories which manufacture natural cement. In 1950-51 the installed capacity was 3·2 million tons, and the actual production was 2·6 million tons. The industry also produces articles manufactured from cement, such as ordinary concrete, re-inforced concrete, marble imitations and cement sheets. The cement industry in India enjoys many natural advantages, such as abundant supply of limestone of excellent quality occurring in many parts of the country close to railway lines, suitable clay also close to railway lines; and the production of gypsum in the country. With regard to fuel, however, the industry labours under a considerable handicap as all the concerns are situated at long distances from the coalfields, and the freight on coal is a very serious item in the cost of production. Limestone is the chief raw material in the process of cement manufacture for which most of the cement

factories are located near limestone deposits. About 1.6 tons of limestone are required to make 1 ton of cement which contains 4 per cent. gypsum and 38 per cent. coal.

LOCATION OF CEMENT FACTORIES

Areas	No.	Centres
Bihar .	.. 5	Dalmianagar and Japla, Chaibasa, Khalari (Ranchi).
M. P. ..	.. 1	Jubbalspur.
Madras	... 5	Madhukarai (Coimbatore), Bezwada, Dalmiapuram (Trichinopoly), Mangalagiri (Krishna).
East Punjab	... 1	Amritsar.
West Bengal	... 1	24-Parganas.
Mysore	... 1	Bangalore
Hyderabad	.. 1	Hyderabad.
Sourashtra	.. 3	Okhamondal (Porbandar).
Gwalior	... 1	Gwalior.
Rajasthan	... 1	
Travancore	... 1	Kottayam.

The manufacture of cement in India was started as early as 1904 in Madras, although its production was negligible. The first World War gave impetus to the industry, and factories were started at Porbandar (Kathiawar), Katni (Madhya Pradesh) and Rajputana. Since then the industry has progressed very rapidly, and the country has attained self-sufficiency. The cement industry is in a position now to meet the full requirements of the country.*

PRODUCTION AND IMPORT OF CEMENT

		<i>Imports</i>	<i>Production</i>
1937	...	49,100	997,000 tons
1948		147,704	1,516,226 „
1950	.	18,664	2,815,000 „
1951	...	12,920	3,300,000 „

* There has been a slight fall in the demand for cement due to the slowing down of several Government projects for financial reasons. There is, however, no overproduction of cement as the *per capita* consumption is still very low. The *per capita* consumption of cement in India is only 16 lbs. compared to 260 lbs. in England and 280 lbs. in America.

With the increase in Indian production of cement, there has been a fall in imports. There is now a duty of Rs. 17-3 per ton on imports. In view of increased production of cement by Indian factories, the Govt. of India decided in August, 1949, to restrict imports to quantities included in Trade Agreements, the total tonnage being about 15,000 tons. The Indian cement faces the competition of foreign supplies only in ports. The up-country market, on the other hand, is entirely in the hands of the Indian cement industry.

The industry may be in a position to export about 300,000 tons to neighbouring countries like Ceylon, Burma, Indonesia, Malaya, Afghanistan and Iran.

The Indian cement industry worked more or less as a single organisation, known as the Cement Marketing Co., Ltd., till March, 1948. Thereafter two separate groups—the Associated Cement and the Dalmia group—are working.

Match Industry

The Indian match industry owes its development to the protective tariff it enjoys. Before 1921 there was no successful manufacture of matches in India except a very small one in Ahmedabad.* With the imposition of duties on imported machines since 1922, there has been a considerable expansion of the match industry, which enjoys a large home market and cheap labour. In order to avoid the protective import duty, a Swedish Company established factories in India during 1924 and 1925 at Bareilly, Calcutta, Madras and Ambernath. This company (Western India Match Co. Ltd.) has now a virtual monopoly of match production in this country and meets nearly 80 per cent. of the demand. In 1938 India imported 55,000 gross of boxes as compared with 13½ million gross in 1921.

At present the Indian Union has 107 match factories compared with 6 in Pakistan. The industry employs about 16,000 workers. The match factories are located in Gwalior, Hyderabad, Dhubri (Assam), Kota (M.P.) and Shimoga (in Mysore), Petland (in Baroda), Madras (Tiruvartiyur, 18 miles from Madras), Calcutta and Trivandrum.

* The first match factory which still survives is the Gujerat Islamic Match Factory which was founded in Ahmedabad in 1895.

PRODUCTION OF MATCHES IN GROSS BOXES OF 50 STICKS

	(in 000's)		
	1946	1947	1948
Wimco	18,796	17,247	22,495
Others	6,745	10,696	9,500

The expansion of the industry depends upon the adequate supply of suitable type of wood. The Indian match industry consumes over 6 million cubic feet every year. Andaman Island is an important source of wood for the Indian match industry.

There is still import of foreign matches though it is on steady decline. In 1952-53, only 400 gross of boxes were imported against 6,000 in 1950-51.

QUESTIONS

1. Draw a map of India locating the areas where there are cotton mills (Cal. Inter., 1944).

2. On a sketch map of India, show the important regions of wool production together with the centres for imported wool. Where is the Indian wool mainly consumed? (Cal. B.Com., 1941).

3. There is a move for establishing (a) automobile, (b) aviation and (c) shipbuilding industries in India. What are the shortcomings in the country in the way of successfully developing these industries and how can these be removed? (Cal. B.Com., 1941).

4. On a sketch map of India, express your views about the prospects of regional distribution of the following industries: Ship-building, Machinery, Chemicals, Glass and Artificial fibres. (Cal. B.Com., 1939).

5. Do you think India possesses all the advantages for the development of automobile industry?

6. Examine the present position of the iron and steel industry of India. (Cal. Inter., 1939, '35; I.I.B., 1940, '37).

7. What is the position of the paper industry in India? What are the raw materials used in this industry and where does the supply come from? Do you think that the Indian paper industry can supply the requirements of the country? State the reasons for your answer.

(Cal. B.Com., 1930, '31; Cal. Inter., 1951).

8. Account for the localisation of (a) the Cotton mill industry in Bombay and (b) the Jute mill industry in Calcutta.

(Cal. Inter., 1932, '35, '38).

9. What special advantages has Bombay for the establishment of Cotton Mills? Do you think Bengal and Orissa are not proper places for the development of Cotton textile industry? (Cal. Inter., 1949).

10. India's steel industry requires expansion. Besides Bihar and West Bengal, which other provinces can offer facilities for erection of Iron and Steel Works? Give your reasons. (Cal. B.Com., 1949).

11. "The entire jute mill industry is in India but India has got approximately 25% of the total jute area of undivided India." Suggest the steps to be taken for increasing the production of jute in the Union of India. (Cal. B.Com., 1948).

12. Discuss the importance of the Jute industry in the economic life of Western Bengal. What are the sources of supply of the raw jute for the industry? (Cal. I.Com., 1948).

13. What are the essential raw materials for the manufacture of Cement? State the places where this industry is at present located in India and discuss its possibilities. (Cal. Inter, 1948).

14. Give an account of the Iron and Steel Industry with special reference to (a) sources of raw materials, and (b) geographical reasons for the location of the industry. (Delhi B.Com., 1952).

15. Account for the location of the Jute mill industry on the banks of the Hooghly basin. Discuss the position of this industry in regard to raw jute supply. (Delhi B.A. Hons., 1952).

16. Give an account of the present position and future prospects of the Jute manufacturing industry of India. (Agra B.Com., 1952).

17. Examine the present condition of the Indian Paper industry. Name the indigenous raw materials used for manufacturing paper and mention where they are found. (Agra B.Com., 1951).

CHAPTER X

FACILITIES OF TRANSPORTATION

The extension of facilities of transportation is the most essential condition for the successful commercial development of a country. A good system of communication by land, water and air is one of the most important of all the requisites for the prosperity of a nation. Transportation permits a country to utilize its economic resources to the best possible advantages. There was practically no organised industry in India till the middle of the nineteenth century due to want of proper facilities of transportation. At present much has been done to develop roads, railways and civil aviation. "Industries have followed transport facilities."

Transportation in India can be divided into four heads. (i) railways, (ii) roads, (iii) waterways, and (iv) airways.

Railways

Railways are the most important of all systems of communication. Originally, railways were built up in India for military purposes and for the exploitation of the natural resources of the country in the interests of the British industries. The frequent visitation of famine also necessitated the extension of railways.* The railways have brought about an equalisation of prices throughout the country. The rapid industrialisation of the country is largely due to railway developments; it has fostered agricultural production and encouraged the establishment of industries.

The physical and geographical conditions of operation of the railway network in India are most favourable in the Gangetic basin which is an enormous plain of dense population. The mountains in the north and the Western Ghats present considerable difficulties with regard to the construction of railway lines. The Satpura and Vindhya ranges are low, and the railway lines

* The first railway line in India was opened in 1853 to connect Bombay with Thana—a distance of 20 miles. The progress of railway construction was very slow on account of financial difficulties. After 1880 several lines—main, branch and feeder were added with the financial assistance of the Government as it was realised that the railway expansion would result in the control of famines in India.

can by-pass the big ranges or cross them by means of tunnels. The Thar desert in Rajasthan with scanty population and resources make railway operation difficult and unprofitable. Thus, in India the railway-route pattern has been very much influenced by the forces of economic geography

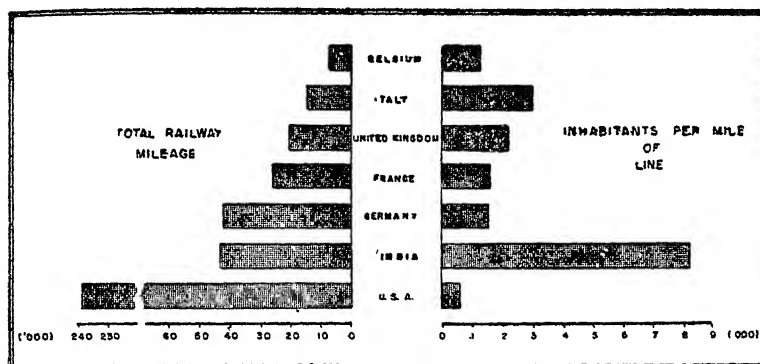


FIG. No. 59.

The Indian railway system is by far the largest in Asia and the second biggest state-owned enterprise in the world. The Indian Railways employ about 1 million persons. The Republic of India has 34,000 miles of railway lines which operate on three gauges: 5' 6", 3' 3 $\frac{3}{8}$ " and 2' 6". The frequent changes of gauge and the scarcity of bridges across some of the bigger rivers are still the main drawbacks of the Indian railway system. To these must be added the absence of railway communications in Kashmir and Nepal.

India requires more railway mileage. In comparison with the U.S.A., Canada and England, India is lagging behind in railway extension.

RAILWAY MILEAGE

Countries	Mileage of total Railways	Mileage of line per 100 sq. miles	Inhabitants per mile of line
India	34,000	2.2	7,800
Canada	57,000	1.10	222
U. S. A.	2,38,000	8.41	450

The Five year Plan provides an expenditure of Rs. 400 crores on railways as it is certain that the increase of industrial activity as a result of the implementation of the plan will make increasing demand on railways. A railway bridge over the Ganges will be constructed at Mokama in Bihar to facilitate the movement of coal, steel, cement, tea, jute, etc. The Government policy is to put the railways according to the needs of the expanding economy of the country.

In 1951, the Indian railways covered 41,709 million passenger miles and 27,000 million ton miles of freight.

The present railway lines of India are grouped into six zones :

1. The Northern Railway.
2. The North Eastern Railway.
3. The Eastern Railway.
4. The Western Railway.
5. The Central Railway.
6. The Southern Railway.

Before the regrouping of these railway lines, India had 9 major railway lines and several State Railways. The nine lines were (i) East India Railway, (ii) Bengal Nagpur Railway, (iii) Oudh and Tirhut Railway, (iv) Assam Railway, (v) South Indian Railway, (vi) Madras and South Maharatta Railway, (vii) Bombay-Baroda-Central India Railway, (viii) Great Indian Peninsular Railway, and (ix) East Punjab Railway.

The formation of these six new railway zones proceeds on the principle of amalgamating small independent lines and well-defined portions of existing railways in contiguous areas into self-sufficient systems, in a compact region having economic unity and natural affinities of trade and flow of traffic.

1. *The Northern Railway* with about 5,000 miles serves East Punjab, Pepsu, Delhi, northern and eastern Rajasthan and Uttar Pradesh up to Banaras. Thus, this line consists of the former East Punjab Railway, Jodhpur Railway, Bikanir Railway and the western section of the East Indian Railway. The head-quarters are at Delhi. The principal lines which are in broad gauge are :

- (i) Delhi-Atari via Meerut, Saharanpur, Ambala, Ludhiana, Jullundur and Amritsar. Distance 333 miles. From Amritsar, a line goes to Pathankot for Kashmir.
- (ii) Delhi-Ferozepur via Bhatinda. Distance 241 miles.

- (iii) Delhi-Kalka *via* Ambala. From Kalka a narrow gauge line goes to Simla.
- (iv) Delhi-Banaras *via* Aligarh, Kanpur, Allahabad and Moghalsarai. Another line goes from Saharanpur to Banaras *via* Lucknow and Janghai.

2. *The North Eastern Railway* with more than 5,500 miles of meter-gauge line serves the northern part of Uttar Pradesh, northern Bihar, northern part of West Bengal and Assam. This line has been formed with the former Oudh and Tirhut Railway and Assam Railway. The head-quarters are at Gorakhpur. The line operates in a well-developed agricultural region and carries

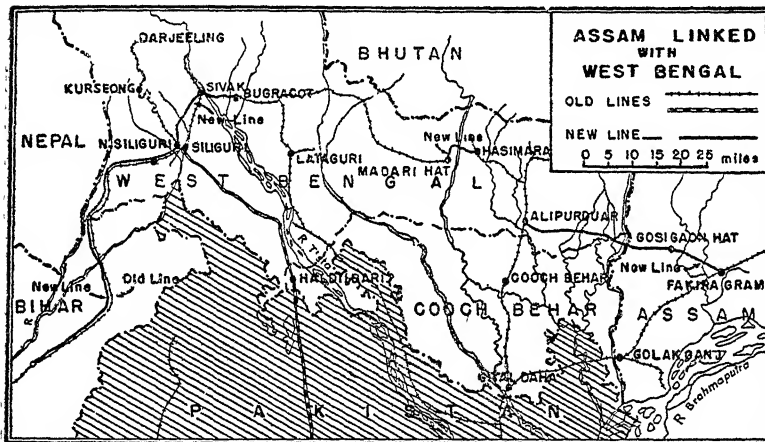


FIG. No. 60. With the creation of East Pakistan, Assam was cut off from the rest of India and a direct railway link had to be provided through Indian territory.

large quantities of sugarcane, tobacco, tea and rice. This railway line operates in conjunction with the Ganges in Bihar and the Brahmaputra in Assam and also with motor roads. The principal railway lines are noted below:

- (i) Gorakhpur-Amingaon in Assam by a new railway line through Siliguri *via* Chapra, Katihar. The creation of Eastern Pakistan took out the direct railway link between Assam and West Bengal. In 1950 a new line was con-

structed to connect Katihar with Siliguri across swampy and disease-infected areas. Siliguri was already connected with Madarihat. A new line was laid from here to Fakiragram.

- (ii) Gorakhpur-Lucknow-Kanpur. Distance 530 miles. A line goes to Bareilly from Lucknow.
- (iii) Gorakhpur-Banaras *via* Saran.
- (iv) Pandu-Gauhati-Tinsukia *via* Manipur Road. Distance 325 miles. The route follows the Brahmaputra valley. It is to be noted that there is not a single railway bridge over the Brahmaputra.

The line joins the Northern Railway at Kanpur, Lucknow and Banaras.

3. *The Eastern Railway* with more than 5,500 miles of line serves Eastern Gangetic region between Moghalsarai and the Hooghly, West Bengal, Chotanagpur, eastern part of Madhya Pradesh and the Andhra area in Madras. The Eastern Railway consists of a part of former East Indian Railway between Moghalsarai and Calcutta and the Bengal Nagpur Railway. Even in this truncated form, the Eastern Railway handles the largest amount of goods traffic and is one of the most important passenger carriers. Approximately half of the freight movement on this line is coal followed by iron ore, manganese, jute, mica and other products. As a matter of fact, throughout the Eastern Gangatic plain, this railway line performs highly varied economic services. The tremendous volume of traffic is accounted for by the fact that Calcutta has not only the largest industrial enterprises, but it is also the most important port of the country. The head-quarters are at Calcutta.

The principal lines are :

- (i) Howrah-Moghalsarai *via* Gaya and Dehri-on-Sone.
- (ii) Howrah-Moghalsarai *via* Patna. Distance 411 miles.
Both these lines proceed to Delhi, Saharanpur and beyond by the Northern Railway.
- (iii) Howrah-Kiul *via* Barharwa, Sahibgunj, Bhagalpur and Jamalpur. Distance 254 miles.

The above mentioned lines are connected with one another by means of several branch lines.

- (iv) Howrah-Nagpur *via* Tatanagar, Bilaspur, Raipur. Distance 703 miles.

The Nagpur line crosses the rich mineral areas and handles the substantial portion of the traffic composed of manganese, coal, iron ore, etc. Tatanagar—the most important iron and steel centre of India—is on this line. A number of feeder lines has been constructed to connect Tatanagar with the manganese and iron fields of Bonai, Keonjhar and Singhbhum.

- (v) Howrah-Waltair *via* Balasore, Cuttack, Berhampur, Vizianagram. Distance 547 miles. This line proceeds to Madras.

There is a very important line which has connected Raipur on the Howrah-Nagpur line with Waltair. The construction of this line has made this section of the Eastern Railway very important. Much of the goods traffic which was previously used to be sent to Calcutta for export now passes through Waltair. This section of the Eastern Railway which was previously known as the Bengal Nagpur Railway normally carries 20 million passengers and 18 million tons of goods.

4. *The Western Railway* with more than 5,000 miles of line serves Bombay, Rajasthan, Madhya Bharat and Madhya Pradesh. This line consists of former B.B.C.I. Railway, the Saurashtra Railway, the Rajasthan Railway and the Jaipur Railway. The line serves the great industrial areas of Bombay, Ahmedabad and Baroda and handles tremendous quantities of cotton. After the partition, the congestion of traffic on this line has increased considerably because of the loss of Karachi. This line handles about 10 million tons of goods and 8 million passengers. The head-quarters are at Bombay.

Principal lines in broad gauge:

- (i) Bombay-Delhi *via* Surat, Baroda, Ratlam, Nagda, Bayana, Bharatpur and Mathura. Distance 861 miles. Bayana is connected with Agra and the latter by a meter gauge line with Kanpur.
- (ii) Bombay-Ahmedabad *via* Surat and Baroda. Distance 306 miles. Surat is connected with Bhusaval and the latter with Nagpur.

Principal lines in meter gauge:

- (i) Ahmedabad-Delhi *via* Abu Road, Beawar, Ajmer, Jaipur and Alwar. Distance 539 miles. Ajmer is connected with Khandwa.
- (ii) Porbandar-Dhola; Rajkot-Veraval; Kandla-Bhuj; Surendranagar-Okha.

5. *The Central Railway* with more than 5,000 miles of line serves Madhya Bharat, Madhya Pradesh and north-western part of Madras. The line consists of the former G.I.P. Railway, the Scindhia Railway, Dholpur Railway and the Nizam State Railway.

The principal lines are as follows:

- (i) Bombay-Delhi *via* Bhusaval, Khandwa, Itarsi, Bhopal, Jhansi, Agra, Mathura. Mileage 958. Itarsi is connected with Nagpur and Allahabad.
- (ii) Bombay-Raichur *via* Poona and Wadi. Mileage 443. The line proceeds to Bangalore.
- (iii) Delhi-Bezwada *via* Itarsi, Nagpur, Wardha and Kazipet. The line proceeds to Madras. Kazipet is connected with Hyderabad.

This line handles cotton and manganese of Madhya Pradesh and timber of Bhopal. Normally it carries 50 million passengers and 11 million tons of goods annually. The head-quarters are at Bombay.

6. *The Southern Railway* has been formed by the amalgamation of Mysore Railway, the Madras and South Mahratta Railway and the South Indian Railway. Its total length is about 6,000 miles. This railway system has both meter-gauge and broad-gauge lines. It serves the densely populated and fertile areas of Madras, Mysore, Travancore, Cochin and parts of southern Bombay and Hyderabad. The head-quarters are at Madras.

Principal lines in broad gauge:

- (i) Madras-Waltair *via* Nellore, Bezwada. Distance 268 miles. The line connects Madras with Calcutta.
- (ii) Madras-Raichur *via* Cuddapa. Distance 351 miles. This line connects Madras with Bombay.
- (iii) Madras-Bangalore. Distance 222 miles.
- (iv) Jalarpet-Mangalore *via* Salem, Erode, Coimbatore, Tellicherry. Distance 423 miles. Jalarpet is connected with Bangalore and Ootacamund.

Principal lines in meter gauge:

- (i) Poona-Harihar. Distance 415 miles. This is an alternative route to Bombay from Madras. The line goes to Bangalore from Harihar.

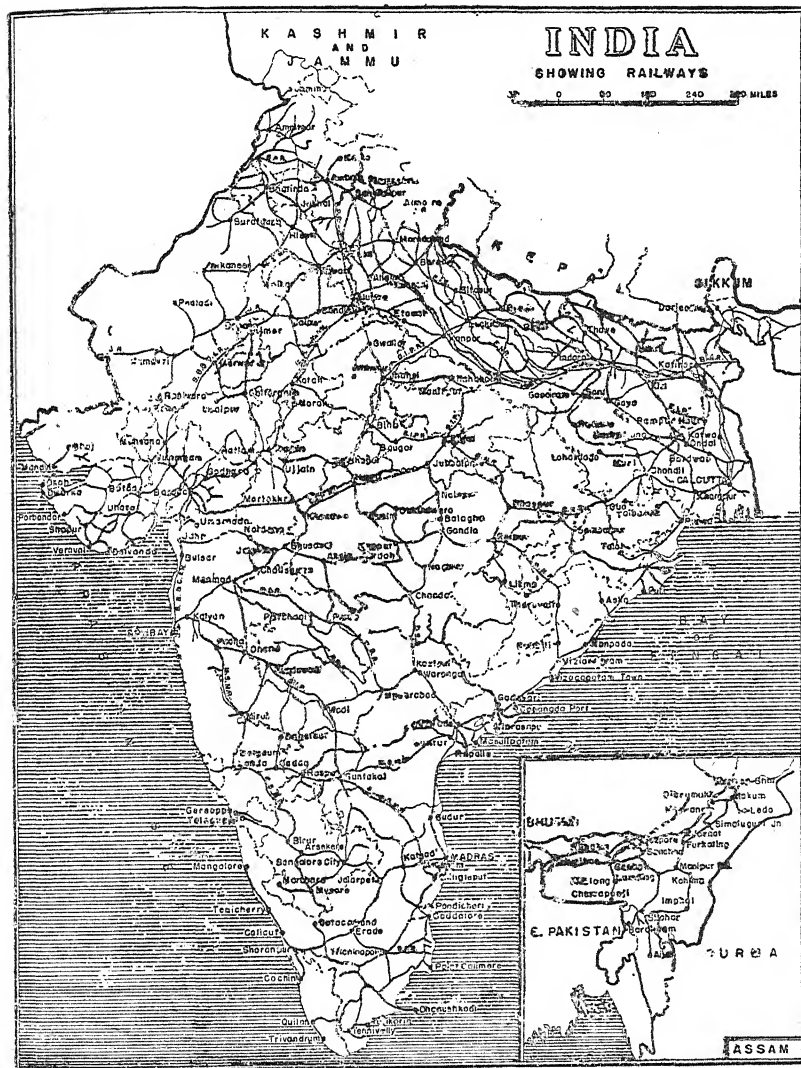


FIG. No. 61.

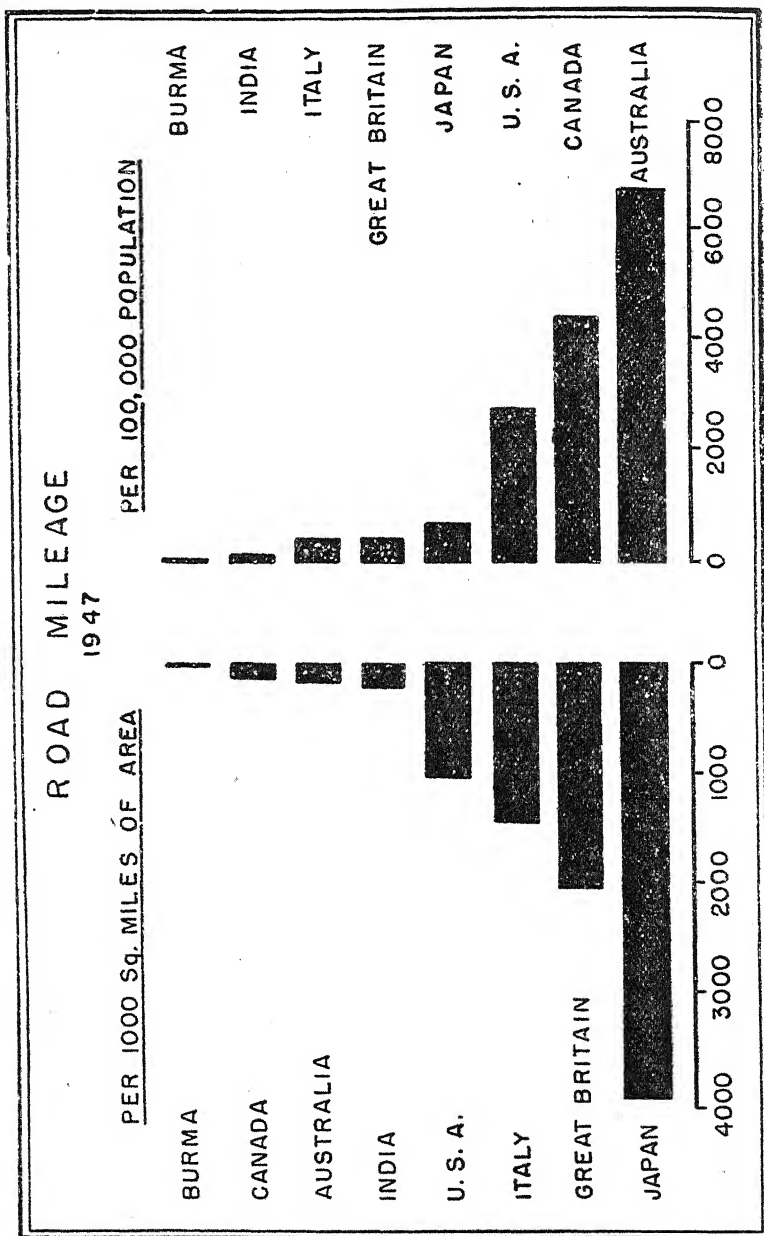


Fig. No. 62.

- (ii) Guntakal-Masulipatam *via* Bezwada. Distance 320 miles.
- (iii) Madras-Dhanuskodi *via* Tanjore and Trichinopoly. Distance 422 miles.
- (iv) Madras-Trivandrum *via* Trichinopoly, Virudhnagar, Madura and Quilon. Distance 512 miles. From Virudhnagar a line goes to Tuticorin.

The lines lead to several ports like Madras, Cochin, Tuticorin, Alleppey, Quilon and Calicut. Grain, cotton, oilseeds, salt, sugar, tobacco, timber and hides are the chief commodities handled.

Road Transport

Indian Union has about 250,000 miles of roads. Considering the size of the country this mileage is very meagre. The backwardness of India's road system can be judged from the fact that 3 miles of roads serve 100,000 population compared to 2,500 miles in U.S.A., 934 in France and 400 in U.K. Of the total roads in India 67,000 miles only are hard-surfaced and the rest are earth roads. Such earth roads degenerate into mud and slush during July-September. The introduction of motor vehicles has resulted in the greater construction of good roads and their improvements. In many parts of India motor transport today serves as the chief means of communication. Widespread road construction has been carried out in the Uttar Pradesh, Kashmir, Madhya Bharat and Travancore. In several States, motor transport is run by the Governments. The important road centres are Delhi, Calcutta, Agra, Allahabad, Nagpur, Hyderabad, Madura, Trivandrum and Indore from which highways radiate in many directions. Good road communication in a vast country like India, which is predominantly agricultural, is essential. Because of the absence of good roads, many cultivable lands lie waste even now. Railways have served their purpose with credit and it is now felt that to help the country to continue the development of its potential wealth, roads must be opened and improved—not to supplant the railways in moving goods and people over long distances, but to provide a properly co-ordinated supplement to railway transportation.

ROAD MILEAGE IN THE DIFFERENT STATES OF INDIA

Madras	...	27,115 miles	M. P.	...	7,535 miles
Bombay	...	13,400 "	Bihar & Orissa	...	3,961 "
Punjab (I)	...	7,000 "	West Bengal	...	3,000 "
U.P.	...	7,776 "			

About 40 per cent. of railway mileage is paralleled by metalled roads. Buses and lorries carry goods and persons from rural areas to towns and railway stations. Motor transport has become an

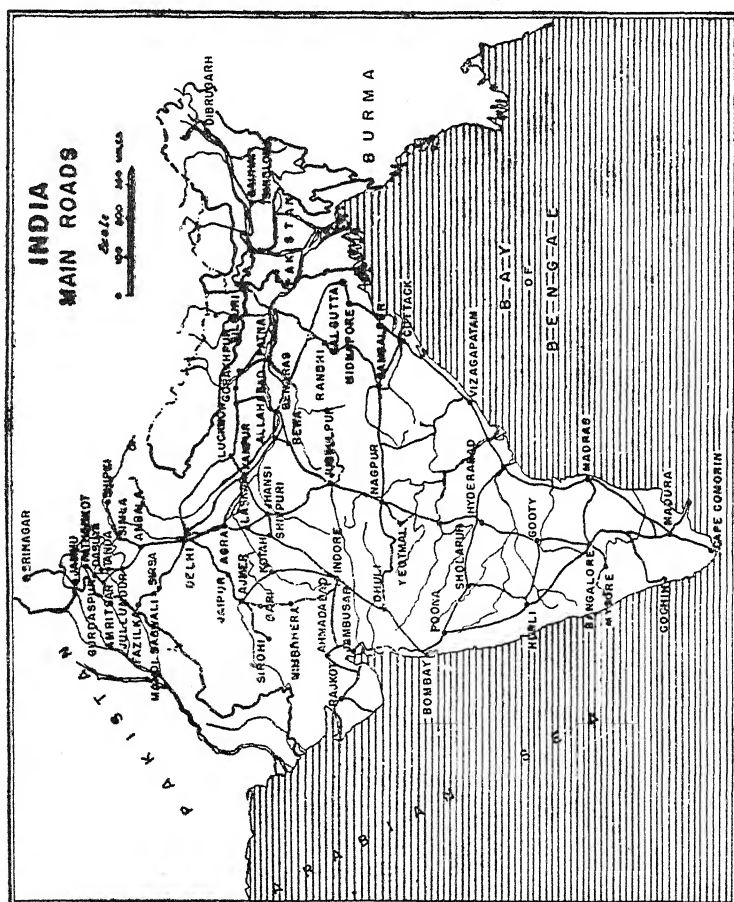


FIG. No. 63.

indispensable agency for short-distance traffic as it affords quick, cheap and flexible service. It cannot be denied that in many cases railways consider the public buses and lorries as competitors. Road transport is cheaper than railways, because it does not require stations, sidings etc., and as such, it can offer low rates. In the neighbourhood of large cities and suburbs and in areas where roads run parallel to railways, competition is confined to short distances only, *viz.*, a range of 50 miles.

There are at present four trunk roads with which subsidiary roads are linked:

- (1) Calcutta to Delhi.
- (2) Calcutta to Madras.
- (3) Madras to Bombay.
- (4) Bombay to Delhi.

These trunk roads comprise 5,000 miles of metalled roads.

The roads are great feeders of railways. They link up the cultivators' holdings with the local markets and the nearest railway station. Without good and sufficient roads railways cannot collect for transport enough produce to render their operation possible. To avoid competition, roads and railways should be extended in such a manner that roads may become the feeders of railways and not their competitors.

In the 5-year Plan, the Government has provided for Rs. 105 crores for the construction of roads.

The Frontier Routes

Although India has an extensive land frontier more than 3,000 miles long, the volume of trade is very small. Dense forests, high mountains and deserts have so long hindered the progress of land frontier trade. There is no through railway line from India to her frontier countries. Yaks, mules, camels and ponies are usually employed in maintaining trade relations with Central Asia, Tibet and Nepal.

There is a route which goes from Leh in Kashmir to Tibet and Sinkiang. This is one of the hardest routes in the world, as it includes the Karakoram Pass (18,000 ft.).

Communications with Tibet are maintained through Darjeeling, Nainital and Bettiah.

From Ledo in north-east Assam the route which runs to China through Burma assumed great importance during the Second World War. This route is known as the Stilwell Road (formerly the Ledo-Burma Road). From Ledo, the route proceeds towards the south and reaches Bhamo *via* Myitkyina. A separate road also reaches Bhamo from Lashio. From Bhamo the route goes towards the east and after traversing a series of high mountains reaches Kunming *via* Paoshan. The distance between Ledo and Kunming is 1,044 miles. The same road continues for another thousand miles to reach Chungking. The Stilwell Road may help the development of Indo-Chinese trade.

A considerable trade passes between India and Pakistan by land frontiers.

Waterways

From the earliest times the trade and commerce of northern India have been much facilitated by the abundance of navigable streams and the flat relief of the region. The approximate mileage of navigable inland waterways at present is 5,144 miles ; rivers account for 2,989 miles and canals 2,155 miles. Before the advent of the railways, the rivers of northern India handled a considerable portion of the country's inland trade. But inland navigation received a great set-back with the development of railways. The withdrawal of water for irrigation purposes from the already meagre dry weather supplies have given additional blow to the water transport system of India. Today, inland water transport in India is of minor importance, its goods traffic in terms of ton-kilometers being only one per cent. of that of the railways.*

The river traffic of India can be made very important in the transport system as such traffic possesses a tremendous freight capacity.

The great disadvantage of the rivers of India is that they usually enter the sea in shallow, sandy delta-mouths, instead of broad and deep estuaries, which, in other countries, offer a pathway for ships and commerce far into the interior.

Besides a large number of minor streams, India has two great rivers which serve, even to-day, as arteries of trade and travel.

* The steamer traffic on the inland waterways in India carries an estimated volume of $2\frac{1}{2}$ million tons in a year.

These are the Ganges and the Brahmaputra and they carry the largest part of the river traffic.

The *Ganges* is the most important river of India. The source of the Ganges is an immense mass of snow at 14,000 feet up on the Himalayan range in the Garhwal district. The river is 1,600 miles long. From Hardwar at the foot of the Himalayas, the Ganges flows in a south-easterly direction through the rich alluvial plains of the U. P., Bihar and Bengal into the Bay of Bengal. For about 500 miles from its mouth, the river maintains a nearly uniform depth of about 30 feet, and, therefore steamers can safely move up to that distance, although country boats proceed as far as Hardwar. "The navigation in the Ganges is quite magnificent and offers probably one of the finest spectacles of its kind to be seen in the world." The Ganges has lost much of its importance as a highway of commerce because of the development of the railways. On the Ganges, steamers used to ply as far up as Gurmukteswar about 400 miles above Allahabad even as late as 1854. The river is now navigable up to Buxar (near Patna). There is a plan to make it navigable up to Allahabad.

The tributaries of the Ganges are mostly on its left bank, and these are the *Gumti*, *Gogra* and *Gandak*. Scanty rainfall and the absence of any snow-capped mountain in Central India account for a small number of tributaries on the right bank of the Ganges. The *Jumna* is a great tributary of the Ganges and runs parallel to it for 860 miles and joins the Ganges at Allahabad.

The important towns on the Ganges are Hardwar, Kanpur, Allahabad, Mirzapore, Banaras, Ghazipur, Patna, Monghyr, Murshidabad and Calcutta, while on the Jumna the towns are Delhi, Mathura and Agra.

The Ganga Barrage Project

About 400 years ago, the Bhagirathi, which is now only a channel, was the main stream of the Ganges in its last stage. Subsequently, however, because of violent floods or some subterranean upheaval, the Ganges took an easterly turn and joined the Brahmaputra at Goaland in Faridpur district of East Pakistan.

Since then the Bhagirathi has much deteriorated as a waterway. Meanwhile the Damodar river which is an important tributary of the Bhagirathi, has moved its mouth 70 miles further

down. These changes have resulted in the silting up of the Bhagirathi. Thus, today it is only a seasonal river. Even its lower course which is known as the Hooghly is subject to the actions of the tides which are responsible for silting up quite a large part of the river.

Owing to the diminished quantity of water which comes from the Ganges and also because of the tides, the water of the Hooghly river gets a saline character. This is a serious problem affecting the supply of drinking water of Calcutta.

Then again with the deterioration of the Bhagirathi, there is no proper water transport to connect Calcutta with Northern India. It is possible to have a through water communication between Calcutta and the Ganges through Bhagirathi.

The present state of Bhagirathi river is also responsible for affecting the condition of Calcutta as a port because it is now becoming dangerous for steamers to move up the Hooghly.

It has been proposed to construct a barrage on the Ganges near Rajmahal which is about 24 miles below Sahibgunj in Bihar. The construction of the barrage will divert a portion of the Ganges water to the Bhagirathi by means of a canal.

The Ganga Barage Project has the following objectives:

1. Construction of the barrage across the Ganga in the border of Bengal-Bihar. The final site has not yet been selected.
2. The provision for a greater volume of water in the Bhagirathi and other rivers of West Bengal.
3. The navigable route between Calcutta and the Ganges
4. The conservation of the river Hooghly for the benefit of Calcutta by bringing down sufficient headwater.

Thus, with the completion of the project the river Bhagirathi will become navigable throughout the year. The salinity of the river Hooghly will also be reduced by the continuous flow of water of the Bhagirathi.

The *Brahmaputra* is one of the longest rivers in the world. It is about 1,800 miles long. It has its source at a height of nearly 16,000 feet, a little east of Lake Manasarowar in Tibet. Flowing eastwards along the foot of the northern slopes of the Himalayas, it enters Assam and takes a sharp bend towards the south-west. After traversing the entire length of the Assam valley, the Brahmaputra again bends towards the south and joins

the Ganges at the south-eastern corner of the Pabna district in Eastern Pakistan.

The Brahmaputra is important for carrying Assam oil, tea, timber and jute which are brought to Calcutta by transferring to rail road system on the border of Pakistan.

The river is navigable by steamers throughout the year and steamers run from the mouth to Dibrugarh, about 800 miles from the sea. There are certain drawbacks in the river which make navigation dangerous: (a) formation of new islands, sand banks and shoals, and (b) the presence of a very strong current during the rains. The rich deposits of silt as the result of floods every year make agriculture very productive in the Brahmaputra basin. In agricultural and commercial utility, the Brahmaputra ranks next to the Ganges.

The principal rivers of Peninsular India are the *Narmada*, *Tapti*, *Mahanadi*, *Krishna* and *Kaveri*. Of these, the Narmada and the Tapti flow towards the west coast. Owing to the greater heights of the Western Ghats, the other rivers flow towards the east. These rivers are navigable in their lower courses only during the rainy season.

There are only a few navigable canals in India, the most notable being (i) the Circular and Eastern Canals in Bengal, (ii) the Ganges Canal running from Hardwar to Kanpur extending over 275 miles, (iii) the Buckingham Canal running parallel to the east coast in Madras over a distance of 260 miles and (iv) the Orissa Coast Canal.

In the Godavari and Krishna Deltas the navigable canals are the main highways. The back waters are also important on the west coast between Cochin and Quilon as waterways.

The need for waterways in India is great. In spite of physical difficulties, much improvement can be made in the existing waterways of the country. Its development would not only remove the congestion of traffic from railways, but would also open up many new areas whose products cannot at present be moved because of high railway freights.

The Economic Commission for Asia and the Far East in 1950, investigated the possibilities of developing traffic on waterways in (i) the Ganga from Buxar to Allahabad, (ii) Gogra upto Bahramghat, (iii) Tapti upto Aorakpur, (iv) Bhagirathi,

(v) Mahanadi and Orissa Coast Canal, (vi) Buckingham Canal, and (vii) Tapti upto Kakvapa and 50 miles above.

The Ganga-Brahmaputra Water Transport Board has been set up to co-ordinate the activities of State Governments in regard to inland water transport.

The Sea-Routes

India has a coastline of over 3,500 miles and merchant ships from all important maritime countries call at her ports. The sea-routes radiate mainly from the five major ports of Calcutta, Vizagapatam, Madras, Bombay and Cochin. The principal sea-routes of India are the Suez route, the Cape route, the Australian route and the Singapore route. *The opening of the Suez route* has increased the volume of trade between India and Europe. The B. I. S. N. and P. & O. Companies control this route so far as the trade relation of India and Europe is concerned. India sends raw materials and food-products and receives in return manufactured articles.

The Cape route connects India with South Africa and parts of West Africa. Sometimes steamers proceed along this route from India to South America. The imports coming into India by this route are cotton, coal and sugar.

The Singapore route is second to the Suez route in respect of volume of traffic. This route connects India with China and Japan. The route also maintains India's trade relation with Canada and New Zealand. The important steamship companies which used to serve this route during pre-war days were the Indo-China S. N. Co. Ltd., the N. Y. Kaisa and O. S. Kaisa.

The imports coming into India through this route are cotton and silk manufactures, iron and steel, machinery, porcelain, toys, chemicals, paper, hardware, etc. The exports from India are raw cotton, pig iron, manganese, jute, shellac, mica etc.

The Australian route is gradually becoming important. It connects India with Australia. The imports coming into India are wheat, raw wool, horses, canned fruits, provisions etc. The exports from India are jute, tea and linseed. The chief ports of Australia engaged in maintaining trade relations with India are Brisbane, Sydney and Melbourne.

Indian shipping carries now about 93 p.c. of the Indian Coastal cargoes and 50 p.c. of the cargoes moving in India-Burma and India-Ceylon as against 33 and 40 p.c. respectively in 1939. Before World War II, no Indian shipping was participating in the country's overseas trade. Indian Shipping Companies are now maintaining regular passenger and cargo services in the India-U.K.-Continent and India-Malaya trade and purely cargo services in the India-U.S.A. and India-Australia trade. The Indian-owned total tonnage in 1951 was 3.91 lakh gross tons. Under the five year plan another 2 lakh gross tons will be added by 1956.

Out of 113 Indian ships engaged during 1952 in coastal and foreign trade, 24 ply in foreign trade.

Development of Air Transport

Indian Union has become a vital force in modern air age, having acquired the fourth place in civil aviation among the nations of the world.

As a meeting point of the air routes between the East and the West, India holds a key position in international aviation. With its vast distances and favourable climate throughout the year, India provides an ideal field for air transport. The speedy advancement of civil aviation in India is regarded as having no parallel in the world.

Indian Union has three big airports at Bombay (Santa-Cruz), Calcutta (Dum Dum) and Delhi (Palam), maintained on international standards, seven major aerodromes at Ahmedabad, Allahabad, Lucknow, Madras, Nagpur, Patna and Vizagapatam, 13 intermediate aerodromes and 22 minor aerodromes. Besides these, there are 26 aerodromes in the States Unions. The Government of India propose to construct in the immediate future new civil aerodromes in 14 places, namely, Ajmer, Aligarh, Berhampur, Calicut, Cuddalore, Dehra Dun, Hubli, Mangalore, Nellore, Ootacamund, Salem, Ratnagiri, Saugor and Surat.

There are three types of air transport routes in India: (a) trans-continental trunk routes, (b) regional trunk routes, and (c) local service routes. A typical trans-continental route is one which connects Bombay with Calcutta and is linked up with foreign and overseas air routes at Bombay and Calcutta. The

regional trunk routes connect foreign and overseas routes at Bangalore, Delhi, Hyderabad, Nagpur etc. The local service routes feed regional and trans-continental routes, such as the Trivandrum-Madras line or Gauhati-Calcutta line or Delhi-Srinagar line.

Compared with U. S. A. and U. K. the progress of civil aviation in India is modest.

The progress of civil aviation in the Indian Republic can be judged from the following facts and figures:

	1946	1951
Miles flown . . .	4 5 million	15.5 million
Passengers carried ..	105,200	449,500
Mails carried	1 million lbs.	7 million lbs.
Freight carried .	1.3 million lbs.	83.2 million lbs.
Total Load ton-miles ...	6,391,000	39,015,000
Capacity ton-miles ...	8.5 million	57.4 million
Load factors	74.8 p.c.	68.0 p.c.

It should be noted that the general economic conditions of the country influence the growth and development of civil aviation. In future, therefore, further extension of air traffic will depend on the rate of economic progress. The two other factors affecting the expansion are the high cost of aviation petrol which is a vital element in the cost of operation, and the small number of industrial and business centres as compared to the size of the country.

The most important feature in the aviation of India is the *night air mail services* in Delhi, Bombay, Calcutta and Madras. *Nagpur* is the meeting place for the exchange of mails. A certain number of passengers are also taken in the air mail service.

Many of India's internal airlines were now running at a financial loss. One of the reasons was that there were too many companies flying India's air-routes. There was in some cases actual duplication. Another reason is that night flying has not become common so that in addition to their short day-time usage aircrafts are grounded for almost half of each 24 hours.

From August 1953, the nationalisation of air services has been effective. Air-transport is the first industry promoted almost wholly by private enterprise with country-wide ramification to be nationalised in India. Although it was the intention of the Government not to rationalise this industry for another 10 years, but

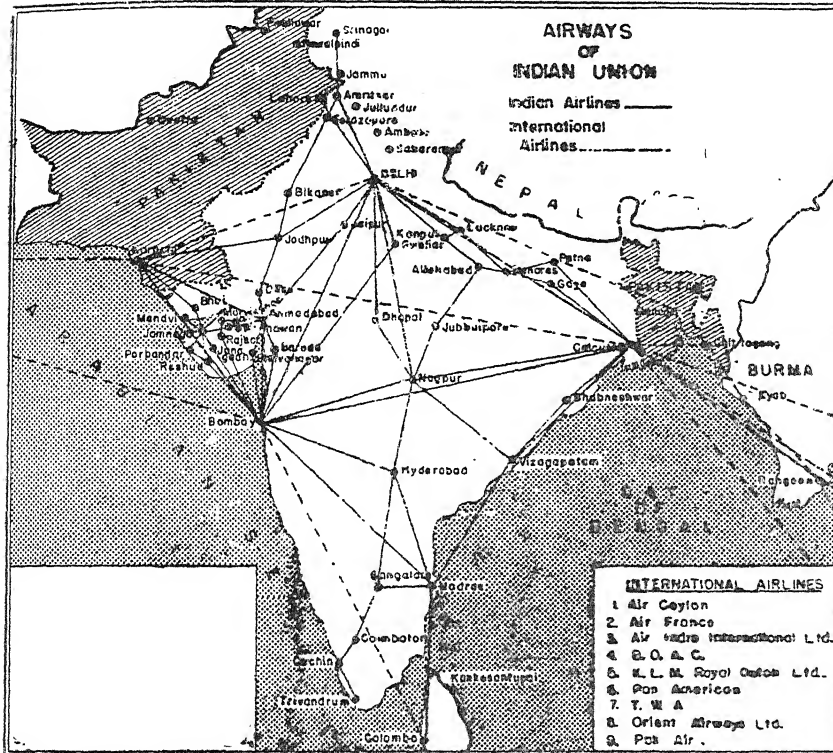


FIG. No. 64. Note the different lines meeting Calcutta, Bombay and Delhi.

then the financial losses of the companies continued to mount up. The financial assistance from the Government had to be increased as many of the companies were facing liquidation.

There are two corporations—one to operate long distance international air services and the other for domestic and short distance international air services such as Pakistan, Ceylon, Burma.

INDIAN AIRLINE CORPORATION

	Miles	Frequency
Route 1. (<i>Air India Ltd.</i>)		
Bombay—Madras—Colombo ...	1780	daily
Bombay—Ahmedabad—Jaipur—Delhi	750	„
Bombay—Calcutta ...	1038	„
Madras—Bangalore—Coimbatore—		
Cochin—Trivandrum . . .	509	„
Bombay—Delhi ..	...	Night service
Bombay—Karachi ...		daily
Route 2. (<i>Indian National Airways Ltd.</i>)		
Delhi—Lahore . . .	264	daily
Delhi—Amritsar—Srinagar ...	245	„
Delhi—Calcutta ...	812	„
Delhi—Jodhpur—Karachi .	683	„
Calcutta—Rangoon ...	...	daily
Calcutta—Katmandu—Patna ...		3 weekly
Route 3. (<i>Air Service of India Ltd.</i>)		
Bombay—Porbandar—Jamnagar—		
Bhuj—Karachi	620	2 weekly
Jamnagar—Ahmedabad . . .	162	1 weekly
Bombay—Bhavnagar—Rajkot .	210	daily
Bombay—Gwalior—Kanpur .	774	2 weekly
Bombay—Poona—Bangalore ...		2 weekly
Bombay—Belgaum—Cochin .		3 weekly
Route 4. (<i>Deccan Airways Ltd.</i>)		
Delhi—Nagpur—Hyderabad—Madras	1155	daily
Hyderabad—Bangalore ...	316	4 weekly
Hyderabad—Bombay . . .	387	daily
Route 5. (<i>Indian Overseas Air Lines Ltd.</i>)		
Bombay—Nagpur—Calcutta ...	1038	„
Route 6. (<i>Airways Ltd.</i>)		
Calcutta—Vizagapatam—Madras—		
Bangalore	1036	4 weekly
Calcutta—Dibrugarh . . .		3 weekly
Calcutta—Bagdogra (For Darjeeling) ...		daily
Calcutta—Nagpur—Bombay ...		daily

CIVIL AVIATION IN INDIAN UNION—*Contd.*

	Miles	Frequency
Route 7. (<i>Bharat Airways Ltd.</i>)		
Calcutta—Chittagong ...	...	daily
Delhi—Lucknow—Calcutta ...	809	3 weekly
Delhi—Kanpur—Calcutta ..	819	4 weekly
Calcutta—Gauhati—Tezpur ...	...	daily
Calcutta—Silchar ..	...	"

Besides these internal services, Indian companies maintain overseas services with the United Kingdom, Burma, China, and Japan.

Several foreign airlines have air service in the Indian Union. These foreign lines are the following:

- I. British Overseas Air Corporation (B. O. A. C.)—London-Calcutta *via* Malta, Cairo, Basra, Karachi and Delhi.
- II. Trans-World Airline (T. W. A.)—Washington-Bombay.
- III. Air France—Paris-Saigon *via* Cairo, Karachi and Calcutta.
- IV. Dutch Airline (K. L. M.)—Karachi-Calcutta-Singapore-Batavia.
- V. Pan-American World Airways—Calcutta to New York *via* Karachi, London, Gander; Calcutta-San Francisco *via* Bangkok, Manila and Honolulu.
- VI. Scandinavian Airways.
- VII. Ceylon Airways.
- VIII. China-National Airways.
- IX. Iran-Airways—Bombay—Teheran.
- X. Pak-Airways.
- XI. Orient Airways.

There is also air service between Indian Union and Pakistan. The chief routes are (a) Karachi-Delhi; (b) Karachi-Bombay; (c) Dacca-Calcutta; (d) Calcutta-Chittagong; (e) Dacca-Delhi.

QUESTIONS

1. Examine the relative importance of the principal means of communications for carrying on inland trade of India (Cal. B.Com., 1931).
2. Draw a railway map of India, and state what geographical factors have determined the direction of the principal trunk routes (Cal. B.Com., 1929).
3. Draw a sketch map of India showing the principal industrial zones and the railways serving them. (Cal. B.Com. Hons., 1941).
4. Draw a map of India showing the air routes with principal air ports. (Cal. Inter., 1940).
5. Give an account of the part played by the rivers in the development of inland trade of India (Cal. Inter., 1939).
6. Describe the main railway routes of India and the traffic found on them. (Cal. Inter., 1929).
7. The railway system of a country is always connected with its relief. Illustrate this with reference to the East Indian Railway.
8. Draw a sketch map of the Indian Ocean showing the principal trade routes and chief ports. (I.I.B., 1932).
9. Mention the essentials of a good system of transport. How far do you find these in case of (a) aerial transport, (b) road transport? Discuss with special reference to Indian conditions (I.I.B., 1933).
10. On a sketch map of India, show the lines of communication in the north-eastern part of the country. Do you think that China and Burma can be connected with India by road or rail through this area? If so, what will be the effect of such a development on the ports of Chittagong and Calcutta? (Cal. B.Com., 1944).
11. Draw a map of India and show the main air routes now in operation with the principal air ports. Discuss the future of air-transport in this country. (Cal. B.Com., 1948).
12. Draw a sketch map of Indian Union, and indicate on it the principal air routes in operation within the country. Discuss possible lines of development, indicating the likely advantages to the nation (W.B.C.S., 1949).
13. Discuss the part played by the Railway for commercial development of India. Do you think India should now pay more attention to the construction of roads and waterways than Railways? (Cal. Inter., 1949).
14. Give an idea of the railway route which you would suggest for linking up Assam with Calcutta without passing through Pakistan.
15. Discuss how far the forces of economic geography have influenced the railway route pattern of India. (Delhi B.Com., 1952).
16. In what directions does the inland transport system of India need improvement? Discuss fully and critically. (Agra B.Com., 1952).

CHAPTER XI

FOREIGN TRADE

Foreign trade is important for several reasons. First, it enables a country to sell its surplus goods to foreign countries at an advantage; second, it can obtain goods and machinery which it does not produce itself but requires for internal economic development; and third, in liquidating international obligations, if any, every country must participate in foreign trade to a more or less extent. Another special advantage of foreign trade is that it brings about a better understanding among peoples who have to come into mutual contact in the process of trade.

The foreign trade of India is fairly large. The Indian Republic occupies a very important position in international trade. In peace time, the country ranks fifth among the trading nations being exceeded only by the U.S.A., U.K., Germany and France. The causes for India's importance in foreign trade generally lie in the nature of her geographic resources and location. Her resources are very great in certain directions. She is the main supplier of ilmenite, mica, monazite, zircon, and jute goods in the world; she has large exportable surplus in iron ore, manganese ore, oilseeds, tea and cotton goods. On the other hand, she produces at present less than her consumption requirements of such important products as machinery, petroleum, vehicles, metals, chemicals, long-stapled raw cotton, raw jute and grains.

Certain characteristics are noticeable in the matter of the foreign trade of the Indian Republic.

(a) *In the composition of India's foreign trade, the share of imports of raw materials is on the increase while the share of exports of raw materials to total exports is on the decline after partition.* Although this change was noticeable during the World War II, it has been accelerated in the post-war years by partition. On the one hand the Indian Republic has lost many of her raw material resources as a result of partition and, on the other, her relatively improved industrial position now necessitates a large domestic utilisation of her raw materials. On the export side, India has lost heavily in jute (from 718,000 tons in pre-war years

to 214,000 tons in 1948), raw cotton (from 485,000 tons to 76,000 tons in 1948), oil-seeds, shellac, hides and skins, tobacco and spices. Thus, in 1938-39, export of raw materials accounted for 45 per cent. of India's exports, while in 1950-51, it was only 23.4 per cent. of the Indian Republic's total exports. On the import side, India imported raw materials in 1938-39 to the extent of 22.7 per cent. of her total imports, whereas in 1950-51, her import of raw materials was 35.1 per cent. of total imports. This change involving a relative decline in the exports of raw materials and a relative increase in their imports is likely to become a long-term feature of our foreign trade; and with the increase of population, and increasing urbanisation, this tendency will be accelerated in the future.

(b) *In the composition of India's foreign trade the imports of manufactured articles are steadily declining and the exports of such goods are on the increase.* The manufactured articles accounted for 45.6 per cent. of India's total imports in 1950-51 as against 61.6 per cent. in pre-war years. Again, the exports of manufactured goods from India accounted for 53.5 per cent. of total exports in 1950-51 as against 30 per cent. in pre-war years. "This change is partly due to India's policy of encouraging exports of manufactured articles and partly due to a relative improvement in the industrial position of India."

COMPOSITION OF EXPORTS AND IMPORTS

	(In percentage of total)			
	Imports		Exports	
	1937-38	1948-49	1937-38	1948-49
Food, Drink, Tobacco	14.1	24.3	23.3	21.2
Raw materials .	22.7	30.7	45.0	23.4
Articles manufactured .	..	..	29.9	53.5
(a) Machinery	11.6	12.1		
(b) Others	50.0	32.2		
Other articles .	1.6	0.7	1.7	1.9
	<hr/> 100	<hr/> 100	<hr/> 100	<hr/> 100

(c) Before partition, the bulk of foreign trade was with the United Kingdom and her Dominions because of Imperial Preference. As a rule, the U. K. and her Dominions sold more

to India than what they bought from India. On the other hand, other countries in Europe, America or Asia, took more of our exports than we imported from them.

The present position is that there is a steady increase in India's trade with the U.S.A., Australia and other Far Eastern countries. Pakistan occupies an important place in India's foreign trade. In 1948-49, Pakistan was the third most important source of imports and the second most important destination of India's exports.

GEOGRAPHICAL DISTRIBUTION OF INDIA'S TRADE

SOURCES OF IMPORTS (in p.c.)			DESTINATION OF EXPORTS (in p.c.)		
	1938-39	1948-49		1938-39	1948-49
United Kingdom	30.2	22.9	United Kingdom	34.1	21.7
Pakistan	...	17.1	Pakistan	..	16.4
Egypt	1.6	5.4	U. S. A.	9.1	15.7
Burma	15.4	5.3	Australia	1.7	4.7
Australia	1.3	5.1	Argentina	1.6	3.8
Iran	1.9	3.0	Burma	6.3	2.4
Italy	1.6	2.7	Canada	1.2	1.8
Argentina	...	2.4	Egypt	0.8	1.7
Canada	0.6	1.5	France	3.2	1.5

(d) The fourth feature of the foreign trade of India is the extremely small proportion of its *land trade*. With the growth of communications, this trade with China, Russia, Pakistan, Burma etc., will develop further. At present about 98 per cent. of our foreign trade is sea-borne.

(e) The difference between the value of export and import is known as the *balance of trade*. When India's exports exceed her imports, the balance is said to be in India's favour. Before the partition, an excess of export was always noticeable in India's trade figures. *After the partition*, the traditional surplus trade balance has now become adverse.

India's total foreign trade in 1950-51 (sea and air-borne and land-borne) amounted to Rs. 1204.44 crores as compared with Rs. 1106.26 crores during 1949-50, and Rs. 1126.66 crores during 1948-49. Imports into India during 1950-51 amounted to Rs. 607.88 crores and exports from India to Rs. 592.01 crores.

There was thus a considerable improvement in the balance of trade position; the deficit balance in 1950-51 being Rs. 11.32 crores as against Rs. 94.48 crores in 1949-50 and Rs. 219.26 crores in 1948-49. This decline in the adverse trade balance in 1950-51 as compared with the preceding two years was due mainly to a large increase in exports of cotton manufactures, oils, tea, gums, resins and lac, raw wool and manufactures, tobacco and fruits and vegetables.

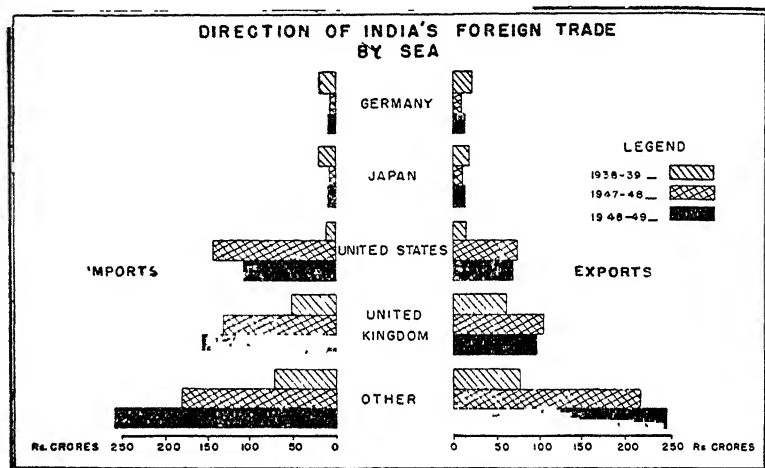


FIG. No. 65.

The spectacular increase in exports was obviously attributable to devaluation and the buoyancy in foreign markets caused by the U.S. and European rearmament programmes.

The Government's relatively restricted import policy and the non-availability of importable goods at reasonable prices also accounted for the improvement in the balance of payments position. The inflation in the prices of foreign goods, subsequent to the outbreak of the Korean war, resulted in a reduction in the quantum of imports, but an increase in their total value.

There was a gradual decline in imports into India by sea from 1948-49 to 1950-51. From Rs. 587.96 crores during 1948-49 sea-borne imports fell to Rs. 565.61 crores during 1951.

The chief articles imported into India by sea during 1950-51 were raw cotton and waste (Rs. 100.76 crores).

COMPOSITION OF EXPORTS

*(In crores of rupees)**Indian Merchandise*

	1950-51	1951-52	1952-53
Food, drink and tobacco	135·81	157 61	142·15
Raw materials and articles mainly unmanufactured	125 80	139 71	145 02
Articles wholly or mainly manufactured	314 77	400 58	259·76
Others	2·61	3 65	3 59
	<hr/> 578·97	<hr/> 701 80	<hr/> 551·04

Exports of Foreign Merchandise

Food, drink, tobacco	0 44	0 26	0·22
Raw materials	23·45	9·16	2 07
Articles manufactured	3·92	4·23	3·22
Others		09	0 1

The principal articles exported from India by sea are cotton yarns and manufactures ; jute yarns and manufactures ; tea ; spices ; oils ; leather ; raw cotton and waste ; seeds ; tobacco ; raw wool and manufactures ; gums, resins and lac ; fruits and vegetables and mica.

Exports and their Destinations

(a) *Jute manufactures*: The buyers are the U. S. A., U. K., Argentina, Pakistan, Australia, Canada. The U. S. A., the largest importer, takes 46 per cent. of the total jute manufactures. Jute goods, the most important of India's export commodities which account for 35 per cent. of India's total earnings of foreign exchange and over 62 per cent. of the earnings of hard currency, seem to be becoming more and more expensive every day. One of the main advantages of jute goods as containers lay in their cheapness. Today their prices are so high that substitutes made of paper and cotton are being used in the U. S. A. in increasing quantities.

The exports of jute manufactures in 1952-53 were valued at Rs. 61 crores for gunny bags and Rs. 63 crores for gunny cloth.

(b) *Tea*: The principal buyers are the United Kingdom, the U.S.S.R., the U.S.A., Pakistan, Canada, Iran and Arabia. The United Kingdom remains the best customer of Indian tea, consuming as she does about 64 per cent. of the exportable surplus. High price of tea is operating against the expansion of tea export trade.

Tea worth Rs. 80 crores was shipped from India in 1952-53.

(c) *Hides and Skins*: The chief buyers are the U.K., the U.S.A. and Pakistan. The U.K. (67 per cent) and the U.S.A. (15 per cent.) are the largest importers.

Exports of raw hides and skins were valued at Rs. 6 crores in 1952-53.

(d) *Vegetable Oil*: Linseed, groundnut and castor oils are the main articles. U.K. is the chief buyer of groundnut and castor. The other buyers are U.S.A., Iraq, Pakistan, Canada, Australia, Italy, Belgium, Ceylon, etc. The U.K. imported 28 per cent. and Italy imported 16 per cent. before the war. In 1950-51, India exported vegetable oil worth Rs 25 crores.

(e) *Lac*. The buyers are U.K., U.S.A and Australia. The U.S.A. is the chief buyer.

(e) Exports of cotton yarns and manufactures rose from Rs. 74.31 crores during 1949-50 to Rs. 134.31 crores during 1952 and those of mica from Rs. 6.85 crores to Rs. 9.61 crores.

COMPOSITION OF IMPORTS

(In crores of rupees)

	1950-51	1951-52	1952-53
Food, Drink and Tobacco	106.90	262.04	175.63
Raw materials and articles mainly unmanufactured ...	198.66	253.03	179.00
Articles wholly or mainly manufactured	258.79	339.71	274.00
Other articles	2.20	5.35	4.07
	<hr/> 566.56	<hr/> 860.14	<hr/> 632.95

Imports and their sources

The chief articles imported into India by sea are raw cotton and waste; Machinery of all kinds; Grain, pulse and flour; Oils; Metals; vehicles; Chemicals, drugs and medicines; other yarns and textile fabrics, Dyes and colours; Cutlery, hardware; Paper, pasteboard and stationery; and fruits and vegetables.

(a) *Machinery*: The chief supplies are the U.K., the U.S.A., Germany, Japan, France, etc. The U.K. is the largest supplier (70 per cent.). In 1952-53, India imported Rs. 86 crores worth of machinery.

(b) *Motor Cars, etc.*: The U.K., the U.S.A., Canada, Germany, Italy and France.

Imports of vehicles were valued at Rs. 20 crores in 1952-53.

(c) *Mineral oil*: Iran, China, Borneo, Sumatra, the U.S.A., Burma, etc.

It accounted for Rs. 26 crores in 1952-53.

(d) *Paper and Pasteboard*: The U.K., Germany, Sweden, Norway, the U.S.A., etc. In 1952-53, India imported goods worth Rs. 12 crores.

(e) *Silk Manufactures*: Japan, China, Italy, the U.K., etc. Japan sends 73 per cent. in normal times.

(f) *Chemicals*: The U.K., Germany, Japan and the U.S.A. India imported chemicals in 1952-53 to the value of about Rs. 13 crores.

(g) *Raw jute*: Pakistan. Indian Union requires about 2 million bales of raw jute annually.

(h) *Raw cotton*: Egypt, the U.S.A., Kenya and Pakistan. Indian Union requires from Pakistan about 1 million bales of raw cotton annually. In 1952-53, she imported raw cotton worth Rs. 77 crores.

(i) *Grains and flour*: Canada, Australia, Burma, the U.S.A., Argentina, Siam and Egypt. In 1952-53, India imported foodgrains worth Rs. 153 crores of which 22 p.c. came from Burma, 21 p.c. from Australia, 19 p.c. from the U.S.A. and 12 p.c. from Argentina.

India's Trade Relation with certain Important Countries

The United Kingdom. The most important feature of the direction of India's foreign trade is the fact that it is dominated by the U.K. both in imports and exports. The U.K. was India's

COMPOSITION OF INDIA'S FOREIGN TRADE, 1951-52

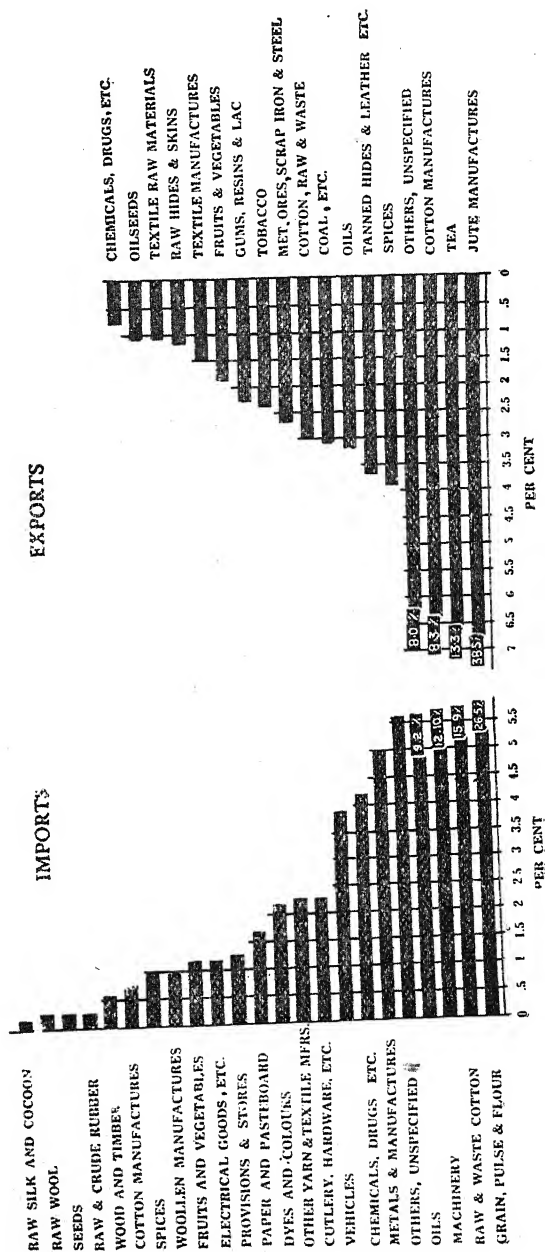


Fig. No. 66.

best customer in 1952-53, its share of Indian exports being worth Rs. 121 76 crores out of total exports worth Rs. 569·88 crores. The principal exports to the U.K. are tea, jute, hides and skins, oil-seeds, raw cotton, raw wool, grains, oil-cakes, metals and ores. Tea alone accounts for more than one-third of the value of total exports to the U.K. On the import side, the chief articles are machinery and mill-works, iron and steel, chemicals, instruments, hardware, liquors, motor cars, rubber manufactures, paper and pasteboard, etc. Machinery and mill-works usually comprise one-third of the value of total imports from the United Kingdom.

U.K. TRADE WITH INDIA

Principal Exports and Imports (£000)

	Full year	
	1951	1952
Total All Exports	115,189	112,149
Of which —		
Machinery	34,169	35,626
Vehicles (including ships and locomotives)	22,846	16,823
Electrical goods and apparatus	8,022	11,391
Chemicals, drugs, dyes and colours	11,545	9,967
	<hr/>	<hr/>
Total All Imports	153,396	114,554
Of which —		
Tea	44,401	48,732
Jute manufactures	25,492	13,256
Seeds and nuts for oil, oils, fats, resins and gums	7,135	6,144
Leather and manufactures	19,785	9,284
	<hr/>	<hr/>

Pakistan. The significance of Pakistan as a supplier to the Indian Union and the importance of Pakistan as a market for Indian goods are great. Pakistan is a valuable source of India's imports. The important articles of import from Pakistan are raw jute, raw cotton, wool, foodgrains, fruits and vegetables. Raw jute and long-stapled raw cotton represent together about 84 per

INDIA - UNITED KINGDOM TRADE 1951 AND 1952

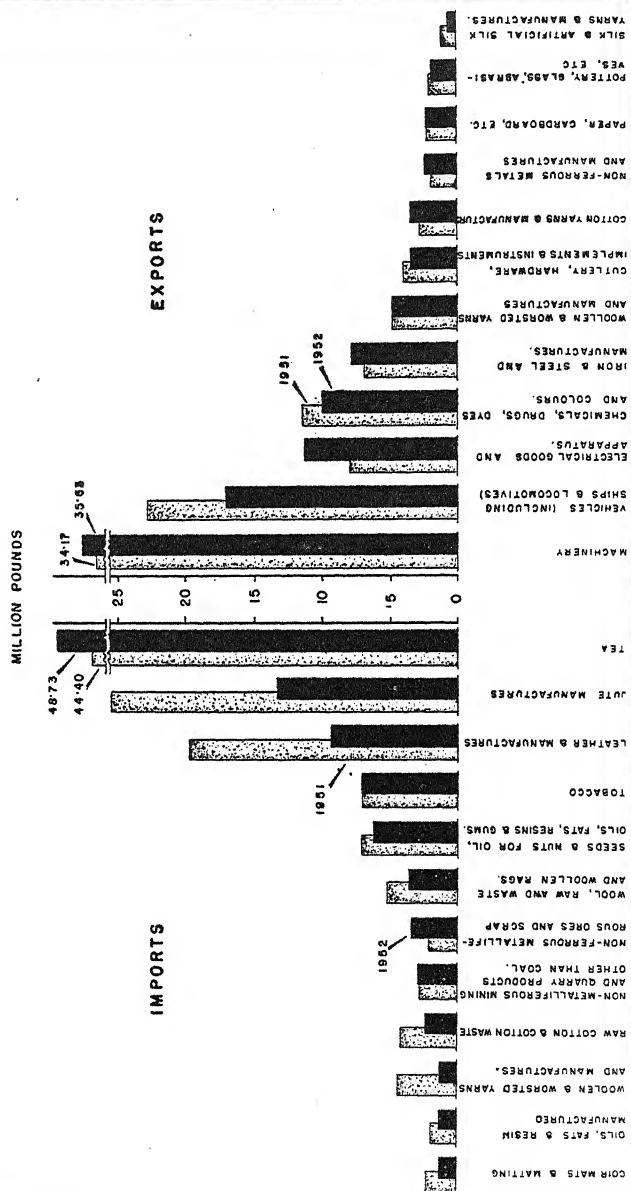


FIG. No. 67.

cent. of total imports.* The exports from Indian Union are cotton cloth, jute manufactures, gur, iron and steel, coal, tea, cement, paper, etc.

INDIA'S TRADE WITH PAKISTAN

(In rupees million)

	1948-49	1949-50	1950-51	1951-52
Export by sea	443	141	134	190
„ by land	304	275	170	262
Import by sea	224	125	46	105
„ by land	850	316	393	1024
Balance	-327	-25	-135	-677

The Indo-Pakistan Trade Agreement. The trade between India and Pakistan is being regulated by the Karachi agreements of 1951. According to the agreements, India is to import from Pakistan, among other things, raw cotton and jute, cow hides and skins and foodgrains. Pakistan will receive from India coal, cloth and yarn, chemicals, jute manufactures, tyres and tubes, leather and footwear, steel, cement and several other articles.

Burma has a large share in the foreign trade of India. Burma sends 5 per cent. of India's imports and occupies the fourth position in the list of India's suppliers. India sends only 2 per cent. of her total exports to Burma. The balance of trade is, therefore, unfavourable to India. Imports from Burma consist largely of rice, petroleum and teak wood. These represent more than 85 per cent of the total imports from Burma. More than 40 per cent. of our exports to Burma consists of cotton and jute manufactures. Other exports are iron and steel, tea, sugar and coal. Burma is India's best customer of coal.

INDIA'S TRADE WITH BURMA

(In lakhs of rupees)

	1948-49	1949-50	1950-51	1951-52
Import	23,40	14,17	18,78	23,34
Export	10,56	14,52	22,46	19,75

* About 60 per cent. of the Pakistan's raw jute is taken by India. If, therefore, for any reason, there is any slowing down or restriction of off-take, the Indian jute-manufacturing industry will be disturbed, but the jute-growers of Eastern Pakistan will be more seriously affected.

Ceylon. The important items of imports into India from Ceylon are copra, cocoanut oil and tea. Unhusked rice, cotton piece-goods, fish and coal are the important items of exports from India. Ceylon is India's second best customer of coal. Other important items of exports to Ceylon are pulses, fruits and vegetables, chillies, oil-cakes and manures.

India has had a favourable balance for many years in her trade with Ceylon.

INDIA'S TRADE WITH CEYLON

(In rupees million)

	1938-39	1948-49	1949-50	1950-51	1951-52
Export	51	119	164	192	163
Import	12	27	29	45	56

Japan. Indian exports to Japan have been continuously declining recently. Imports into India from Japan are cotton manufactures, artificial silk, silk manufactures, wool manufactures, glass and glass-wares, iron and steel machinery and mill-works, earthenware and porcelain, toys and requisites for games and hardwares, chemicals, paper and pasteboard and stationery, raw silk, rubber manufactures, electrical instruments and apparatus, paints and painting materials. The principal items of India's exports to Japan are raw cotton, pig iron, manganese, jute (raw and manufactured), mica, shellac etc. Raw cotton usually constitutes more than a quarter of Japan's total imports of foreign goods.

West Germany. In normal times, imports from Germany into India consist of iron and steel, brass and copper, hardwares, machinery and mill-works, glass and glasswares, liquors, paper and pasteboard, woollen manufactures, salt, blankets etc. Exports to Germany consist of jute (raw), grain, pulses, flour, cotton (raw), seeds, hides and skins (raw), lac, coir manufactures, bones, hemp (raw) etc. Jute accounts for nearly one-fourth of the total value of exports to Germany.

In July, 1949, a trade agreement was made between India and Germany which provided for the issue by both countries of export and import licences for certain commodities.

INDIA'S TRADE WITH GERMANY

(In lakhs of rupees)

	1947-48	1948-49	1949-50	1950-51	1951-52
Import	4	225	641	1096	2828
Export	90	261	950	1092	938

United States of America. India has generally enjoyed a favourable balance of trade with the U.S.A. The principal items of exports from India to the U.S.A. are jute and jute goods, shellac and lac, cashew nuts, tea, hides and skins, carpet, wool, leather, undressed furs and mica. These items totalled Rs. 112 crores in 1950-51. The main items of India's imports from the U.S.A. are wheat and bread grains, other foodstuffs, chemicals, machinery, unmanufactured tobacco, metals and metal manufactures, petroleum and its products, textiles and raw cotton. The value of these items totalled Rs 116 crores in 1950-51. The excess of imports over exports was due primarily to India's need for large quantities of foodgrains. Thus India's balance of trade with U.S.A. depends on the extent to which India would continue to import foodgrains and capital goods and also on India's ability to increase exports of commodities to America.

In 1947-48, the U.S.A. was the best supplier and the second best customer of India. In 1948-49, she lost ground both in India's exports and imports; while on the import side, she lost her first place to the U.K., on the export side, she lost her second position to Pakistan. In 1951, she was again second in importance to India with regard to her exports.

India's Trade Agreements. India has concluded bilateral trade agreements with several countries. These agreements constitute an important development in India's foreign trade policy in as much as the objective is to reduce the strain on the country's limited supplies of foreign exchange by securing essential goods from non-dollar areas in return for India's staple exports. The agreements concluded are with Czechoslovakia, Egypt, Finland, Germany, Hungary, Japan, Pakistan, Poland, Switzerland, U.S.S.R. and Yugoslavia.

India has Land Frontier Trade with Pakistan, Nepal, Tibet and China. The principal commodities that are imported by India from these countries are grain, jute, fruits, raw wool, living animals and raw silk. The most important exports are cotton goods, sugar, leather manufactures, tea, silk goods, iron and steel goods and salt.

Imports from Pakistan consist of raw jute, fish, eggs, raw hides and skin, poultry and fruits. Raw jute alone accounts for 6/7 of the total imports from Pakistan in terms of value. Exports to Pakistan are coal and coke, manufactured textiles, wood and timber, machinery and mill work. About 6/7 of the exports consist of coke and coal in terms of value.

Afghanistan sends by land to India dried and fresh fruits, raw skin, raw wool and asafoedita. Fruits account for 4/5 of the trade by value. The exports to Afghanistan from India by land are tea, manufactured textiles, boots and shoes and tanned hides and skins. About $\frac{2}{3}$ of such exports consist of tea by value.

There is a little trade by land between India and Burma through Manipur in Assam-Burma frontier. India sends spices, leather and textiles.

The value of trade in 1952-53 was about Rs. 44 crores of which imports into India was valued at Rs. 25 crores. About two-thirds of imports by value consisted of raw jute. With regard to exports by value, coal and coke, metal ores and minerals accounted for one-third. Tobacco, wood and timber and vegetables are other items which were exported in 1953 valued at Rs. 3 crores.

India has also a large Entrepot Trade. The entrepot trade of a country consists of the re-export of articles previously imported. In other words, a country which imports things with a view to exporting them is known to have entrepot trade. India occupies a very favourable geographical situation for the purpose of doing entrepot trade as she is at the centre of the Eastern Hemisphere.

From the West, cotton, chemicals, machinery, minerals and metals are imported for distribution to countries like Kenya, East Africa, Japan, Straits Settlements and China.

QUESTIONS

1. Discuss the trend of India's exports to the U.S.A. What are India's imports from that country? Discuss the possibilities of expansion of this trade.
(B.Com., 1939, '43 ; Delhi, 1949).

2. It is said that export markets for India's manufactures can be developed in Arabia, Iraq, Iran and Afghanistan. Discuss the possibilities of such developments with particular reference to the articles for which such potential markets exist.
(B.Com., 1938).

3. Describe the nature of India's foreign trade across her land frontiers. In which directions are there possibilities of expansion in this trade?

(B.Com., 1937).

4. Discuss the nature of commercial exchanges between India and the Middle East. Do you believe that the latter is a potential market for India's exports, particularly of manufactured goods? (B Com., 1937, '35).

5. Give a brief account of the articles which enter and the countries which participate in the external trade of India carried on by land routes. What steps should be taken for its improvement? (B A. Hons., 1941).

6. Have you got any idea about the trade which India carries on with other countries by land route? What are the countries which participate and the commodities which enter in this trade? (Cal. Inter., 1941).

7. Write a short essay on the foreign trade of India stating (a) imports and their sources, and (b) exports and their destinations.

(Cal. Inter., 1933; B.Com., 1937; Cal. Inter., 1950).

8. Analyse the nature and direction of U.K.'s trade with Indian Union. Do you notice any remarkable change as compared to Indo-U.K. trade during the period between the two wars?

(W.B.C.S., 1949; Delhi B.A. Hons., 1951).

9. State briefly the main articles of imports into India and the countries of their production. Also state which of those articles could be produced within India. (Cal. Inter., 1948).

10. State the principal features of Indo-U.S.A. trade. How far do you think this trade admits of development? (Delhi B.Com., 1952).

11. What are the characteristic features of the foreign trade of India? What changes have taken place in the items of our exports and imports after partition? (Cal. Inter., 1951).

12. Examine and explain the nature of the foreign trade of India. What important changes have taken place in it in recent years?

(Agra B Com., 1951).

13. To what extent is the Indian Republic dependent on Pakistan for the supply of raw materials? Are there alternative sources available for such goods? (Agra B.Com., 1953).

CHAPTER XII

PORTS AND TRADE CENTRES

Industrialisation of a country may be measured by the growth in the number of its cities. In India the great majority of the people derive their livelihood from agriculture. Consequently there is a great variation in urban and rural population. About 15 per cent. of the total population live in the cities or in the suburban districts of India.*

There are only 49 cities in India with a population of two classes—those having more than 2,00,000 and those having less than 2,00,000.

DIMENSION OF URBAN POPULATION IN INDIA

States	P.c. of the urban population	States	P.c. of the urban population
Bombay ...	24	M. P. ...	11
West Bengal ...	22	Delhi ...	78
Madras ..	16	Ajmer ...	37
U. P. ...	12	Saurashtra ...	25
East Punjab ...	15	Madhya Bharat ...	15
Bihar ...	5	Pepsu ...	15
Mysore ..	18	Assam ...	3
Kashmir ...	10		

TOWNS WITH POPULATION OF 200,000 AND OVER

(in 000)

Towns	Population	Towns	Population
Calcutta ...	4,109	Banaras ...	263
Howrah ...	379	Kanpur ...	487
Ahmedabad ...	591	Lucknow ...	387
Bombay ...	2,840	Allahabad ...	261
Poona ...	258	Amritsar ...	391
Sholapur ...	213	Nagpur ...	302
Madras ...	1,429	Delhi ...	1,743
Madura ...	239	Bangalore ...	248
Srinagar ...	208	Hyderabad ...	739
Agra ...	284	Indore ...	204

* A town in India means a collection of houses, inhabited by not less than 5,000 people. A city is a town with over 100,000 inhabitants.

TOWNS WITH POPULATION OF LESS THAN 200,000

(in 000)

Towns	Population	Towns	Population
Bhatpara (Bengal) ...	177	Gaya ...	105
Surat ...	171	Jamshedpur ...	149
Calicut ...	126	Patna ...	176
Coimbatore ...	130	Jubbulpur ...	178
Salem ...	130	Ajmer ...	147
Trichinopoly ...	160	Baroda ...	153
Bareilly ..	193	Bhavnagar ...	103
Jhansi ...	103	Bikanir ...	127
Aligarh ..	113	Jaipur ...	176
Meerut ...	169	Jodhpur ..	127
Moradabad ...	142	Kolar (Gold field) ...	134
Saharanpur ...	108	Lashkar (Gwalior) ...	182
Shahjahanpur ...	110	Trivandrum ...	128
Jullandhar ...	135	Mysore ...	157
Ludhiana ...	112		

Principal Ports

A modern port is in effect an important junction or point of transfer in overseas trade, either for a further voyage or to land transport—more particularly, of course, by rail, but also by inland water channels, whether natural or artificial and now by road to a constantly increasing extent.

The fundamental importance of a port consists in the extent and productiveness of its hinterland. Hinterland means a region to which a port acts as a “door”. The extension of facilities of transportation determines the size of a hinterland while the productivity is measured by its products and density of population.

There are two classes of ports in India: major and minor. “The sheltered nature of a port, the well-laid-out approach channels, the provision of docks, jetties and moorings, the well-laid-out transit sheds, the effective rail connections, the ability to serve a very large portion of the hinterland lying behind the port, the facilities for meeting the requirements of defence and strategy, the comparatively large volume of traffic and the

possibilities of work for shipping all the year round, usually distinguish a major port from a minor port."

India is a vast country with a coast-line of about 3,500 miles. Unfortunately her coast-line has a few indentations and consequently she has only a few major ports for trade. The southern side is deficient in harbours to accommodate large vessels now employed in sea-borne trade. The violence of monsoon keeps the ports of the western coast of India, with the exception of Bombay and Mormugao, closed to traffic from May to August. Then, again, the eastern coast is surf-bound and as such requires constant dredging.

The chief ports of India are Bombay, Mormugao, Mangalore, Tellicherry, Mahe, Calicut, Cochin, Tuticorin, Nagapatam, Pondicherry, Madras, Masulipatam, Vizagapatam, Cocanada and Calcutta. But of the total sea-borne trade of India, more than 90 per cent. is shared by Bombay, Calcutta, Cochin, Madras and Vizagapatam which are the only major ports of India. The ports on the coast of the Deccan have restricted hinterlands, but recently some of them have been enlarged by the development of railways and other communications.

The average ship-borne traffic in India is 20 million tons per annum and the total optimum handling capacity of the major ports is hardly more. Any increase in trade results in congestion at the ports. In 1948-49, the position of the different ports in respect of turnover cleared was as follows:

	Million tons			Million tons
Calcutta	8	Cochin	...	2
Bombay	6			
Madras	2.50	Vizagapatam	...	50

The concentration of India's ocean-borne trade in these major ports is due to a number of causes. Geographical cause is, no doubt, important, but more important is the historical one. Bombay, Madras and Calcutta have been centres of administration for a long time. Population increased and with it commercial and industrial activities were inspired. Moreover, the railway systems were constructed from these ports during the latter half of the 19th century. Thus from political and railway centres they developed into great ports.

THE PRINCIPAL PORTS ON THE WESTERN COAST OF INDIA

Kathiawar ports are Okha, Bedi Bandar, Porbandar and Bhavnagar. *Bedi Bandar*, in Nawanagar, is a small port which does considerable coastal trade. The sea is shallow and, therefore, large steamers must anchor about 2 or 3 miles away from the shore. *Okha*, in the Baroda State, occupies a very good position at the extreme north-east point of the Kathiawar Peninsula. Although the sea in this part is deep enough for large vessels, the circuitous approach to the port makes navigation rather dangerous and the scanty population and small railway mileage of the hinterland stand in the way of its development. The port is open at all seasons of the year and competes sometimes with Bombay by offering lower port charges. The imports are textile machinery, motor cars, sugar and chemicals. The exports are oil-seeds and cotton.

There is at present no major port on the Kathiawar-Cutch coast. With the loss of Karachi, the 1,000 mile long coast-line between Bombay and Karachi is badly in need of a major port to serve the hinterland. The Government of India have decided to develop *Kandla*, a small port of minor importance into a major port. The urgency of a major port between Bombay and Karachi was felt as early as 1946 by the Ports Committee. Partition of the country made it still more necessary because of the loss of Karachi. The West Coast Major Port Development Committee recommended that in 1948 a major port should be located at Kandla. The present port of Kandla was built in 1930 to meet the requirements of the Cutch State only. There is only one jetty to provide a single berth for medium sized ships. A narrow gauge railway links the port with certain parts of Cutch.

Kandla creek, situated at the eastern end of the Gulf of Cutch, constitutes a natural sheltered harbour and is easily navigable. It has a depth of water of over 30 feet, suitable for ocean-going ships. Kandla has a bar across the entrance to the creek. The deep channel over the bar has a minimum depth of 13 feet and the minimum rise of the tide on any day of the year is 17 feet. There has been no deterioration in the navigational conditions at the mouth of the creek over a period of 20 years. The geographical position of the port is also best suited to replace the port of Karachi in its services to the hinterland covering Cutch, Saurashtra, northern part of Bombay, Rajasthan, Punjab, Kashmir and

Western U. P. As between Kandla and Karachi, Delhi is 656 miles from Kandla as against 783 miles from Karachi. Similarly, Hissar is 688 miles from Kandla as against 733 from Karachi. Moreover, potentialities for development of industries and mineral resources in the territory of Cutch are vast, particularly those of fish, cement, glass, gypsum, lignite and bauxite. The present disadvantages of Kandla are non-existence of trade facilities and rail-communications. In October 1952, a railway line was opened which now for the first time connects Kandla with the mainland. This line extends for 170 miles and meets the main railway line at Dessa. There are 15 major bridges along the route, the largest

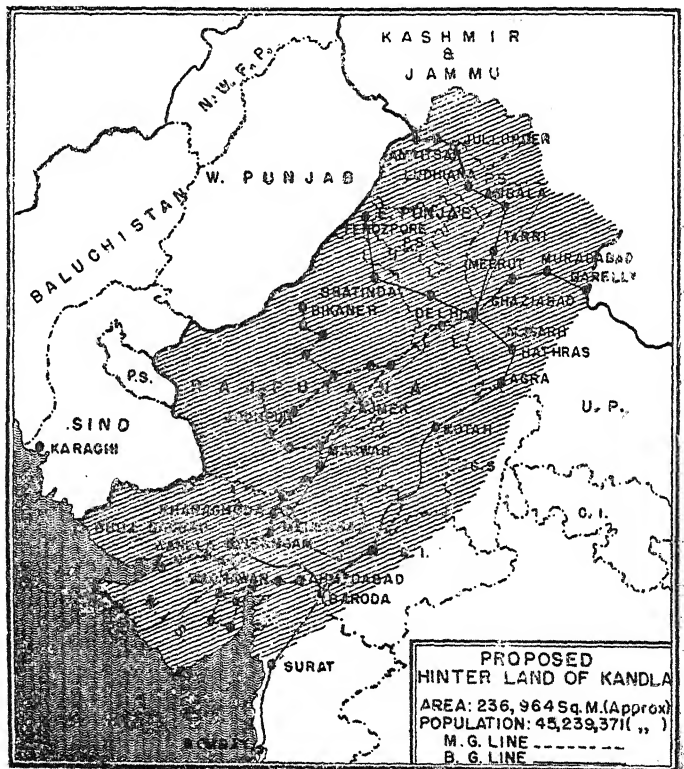


FIG. No. 68. In area, it will be the third largest hinterland in the Union. Kandla will provide an outlet for the large hinterland covering Cutch, Saurashtra, Northern part of Bombay, Rajasthan, Punjab, Kashmir and Western U. P.

being the one over the Banas river about 2 miles from Dessa. There is at present an air-port at Bhuj, and the Government have considered the question of providing another one near Kandla.

Work of the construction of the new major port of Kandla has been taken up vigorously since 1949. Of all the problems confronting the development of the Kandla port town, the subject of water-supply is the main one. Cutch is an arid area, and the annual rainfall is a little above 12 inches. So, an adequate water supply must be assured before the port is developed. There is a substantial reservoir of underground water around Kandla—enough for the port and the town. There is also a surface water reservoir with a storage capacity of 448 million cubic feet which can be utilised in years of satisfactory rainfall. Among the facilities that will be available at the Kandla port when it is fully developed will be (a) four deep-water cargo berths, (b) four warehouses, (c) five mooring berths in the stream, (d) an oil berth to take large tankers, (e) a floating dry dock for small crafts, and (f) a floating landing stage for passenger launches. The traffic expected to flow through the port will be about 8,50,000 tons a year. The latest bore hole that has been sunk for underground water is reported to be yielding 35,000 gallons of water per hour.

Bombay lies at the base of the Western Ghats. It has a natural harbour directly on the sea. The hinterland of Bombay extends from Hyderabad and the western part of Madras in the south to Delhi in

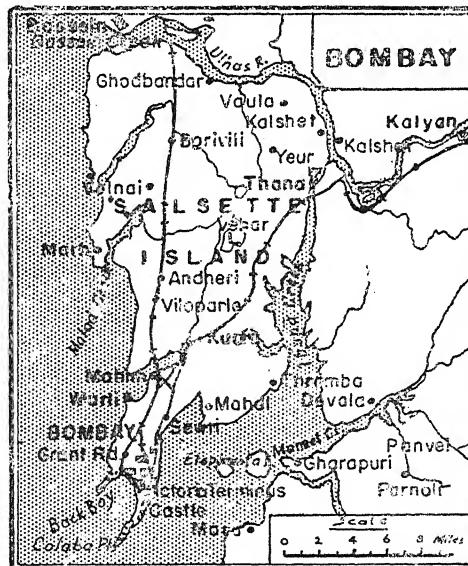


FIG. No. 69. Bombay is an inland port. It is connected with the mainland by railway bridges. The shape of Bombay Island is something like a lobster's claw, the pincers of the claw being Malabar point and Colaba point, and Back Bay the deep curve between.

the north, and includes Western U. P., Eastern Rajputana, M. P., Madhya Bharat and the Bombay State. It is the second city in the Indian Union and owes its importance to its magnificent harbour and its position as the nearest Indian port to Europe. It is connected with the interior by railways (Western Railway and Central Railway). It is the seat of the cotton textile industry. Although Bombay does not possess rich coal-fields within 200 miles or a system of navigable rivers to bring produce down to the port, her volume of trade is always large in view of her natural harbour which is open at all times of the year. Bombay is the principal outlet for the staple products of Western India, in particular, the raw cotton of the Deccan. Large quantities of oil-seeds, wool and woollen goods, hides and skins, manganese ore and foodgrains are exported. The principal imports are manufactured cotton goods, machinery, railway plant, iron and steel goods, hardware, sugar, kerosene oil, dyes, coal and petroleum. In the year 1947-48, the Bombay port handled 36 million tons of imports and 14 million tons of exports. Recently the traffic of the Bombay port has considerably increased because of the loss of Karachi due to partition.

Mormugao, on the Konkan coast, is situated on the eastern extremity of the Mormugao peninsula in Portuguese India. Its hinterland extends to Bombay-Deccan, Hyderabad and Mysore. Manganese, groundnuts, cotton, cocoanuts etc., are the principal exports.

Calicut, 90 miles north of Cochin, is a port of periodical importance. During the early part of the monsoon, the port is practically closed to navigation. As the sea is shallow, steamers anchor about three miles off the shore. Coir, coir-fibre, copra, coffee, tea, ginger, groundnut and fish manure are the exports.

Cochin, in Madras, is the most important port between Bombay and Colombo. Its position is such that it can serve the whole of Southern India. Cochin is nearly 300 miles nearer to Aden than Bombay. "The system of back-waters running parallel with the coast affords cheap transport and excellent water-ways connecting several places of importance in the Cochin and Travancore States." Coir, yarn, coir mats and mattings, copra, cocoanut oil, tea and rubber are the chief exports from Cochin.

THE PRINCIPAL PORTS ON THE EASTERN COAST OF INDIA

Tuticorin, an important port of the Madras Presidency, is situated at the extreme south-eastern point of the Peninsula. The harbour is shallow, and constant dredging is necessary. Cotton, tea, senna leaves and cardamoms are the principal exports. The port has considerable trade with Ceylon. The value of foreign trade in 1938 was worth Rs. 10 crores, of which exports amounted to Rs. 5.5 crores.

Madras, the third largest city in India, is the chief port of the State. Several railway lines connect it with Bombay, Tuticorin, Calicut and Calcutta. Although the port has considerable manufactures, it cannot be compared with Calcutta or Bombay as a trade centre. Its extensive hinterland includes the whole of the Eastern Deccan, but then this area does not produce things which are required by the European markets in large quantities. Moreover, many small seaports on the Coromondal and Malabar Coasts compete with Madras. Madras handles only some 5 per cent. of India's foreign trade. Its harbour is artificial. Before the construction of the harbour, Madras

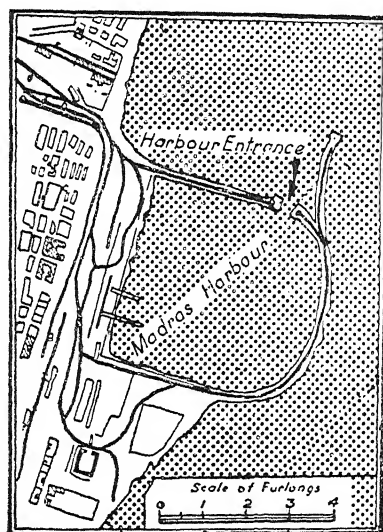


FIG. No. 70. Madras is an artificial harbour ill-suited to shipping during cyclones which occur in October and November.

was an open roadstead with a surf-beaten coast. The imports are cotton piece-goods, iron and steel, machinery, dyes, sugar, leather goods, paper, etc. The chief exports are oil-seeds, raw cotton, coffee, tobacco, rubber and fish. It is also an industrial town, but lack of coal is its great handicap. The value of foreign trade in 1938 was to the extent of Rs. 34 crores, of which exports accounted for Rs. 18 crores.

Vizagapatam: It has become a major port within very recent years. It is a port of call for all ocean-going and coastal traffic steamers. It is situated on the Coromondal Coast, about midway between Madras and Calcutta—500 miles south of Calcutta and 325 miles north of Madras. Manganese, groundnuts, myrobalans, hides and skins are the chief exports. Cotton piece-goods, iron, timber and machinery are the important imports.

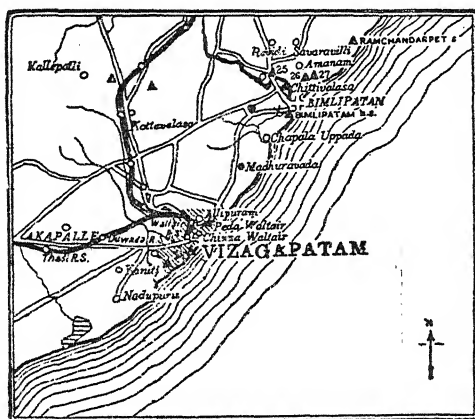


FIG. No. 71. Vizagapatam.

For shipping the produce of Orissa and the eastern part of M. P., Vizagapatam offers better facilities in respect of distance and charges than Calcutta. To a certain extent Calcutta has been affected adversely by the opening of this young port. Recently a ship-building yard has been opened here.

The port is connected

by the E. R. with Raipur in M. P. The opening of the line has greatly reduced the distance to M. P. markets.

Calcutta, the largest city in India, is situated on the left bank of the Hooghly, nearly 80 miles from the Bay of Bengal. Although, primarily, it is a port for the Gangetic plain, it is also the greatest trading centre to the east of the Suez. Its hinterland comprises Assam, Bengal, Bihar, the Uttar Pradesh and parts of the Eastern Punjab, Orissa and Madhya Pradesh, which are all connected with Calcutta by roads and railways. All these areas produce in large quantities goods which are wanted by foreign markets. The Ganges and the Brahmaputra by providing splendid natural water-ways help to bring agricultural produce of the plains to be exchanged for the manufactured goods in Calcutta. As a matter of fact, the trade of Calcutta depends to a large extent upon water-way communications. It was estimated that, before partition, about 25 p.c. of the merchandise reaching Calcutta from the rest of India came by waterway, and approxi-

mately one-third of this from Assam. As regards trade from Calcutta, about one-third was carried by water and of this nearly three-quarters went to Assam.

The port of Calcutta, which extends for about five miles along the banks of the Hooghly, suffers from the disadvantage of the river being silted up. The frequent formation of tidal bore in the Hooghly is another difficulty. In spite of these defects, Calcutta held during the World War II the record of being the fastest cargo-handling port in the world. The port authorities are planning the provision of greater facilities for incoming and outgoing ships. A proposal is being examined for a 30-mile ship canal from Kidderpore to Diamond Harbour.* Calcutta with its suburbs is the greatest manufacturing area in India. Its jute mills, paper mills, cotton mills, sugar factories, engineering works, etc., use coal of Raniganj and Jharia. Calcutta is the greatest jute centre of the world. Other industries of importance are rice mills, cotton mills, tanneries, perfumeries, iron and steel works and match-making. The principal exports are jute, tea, mica,

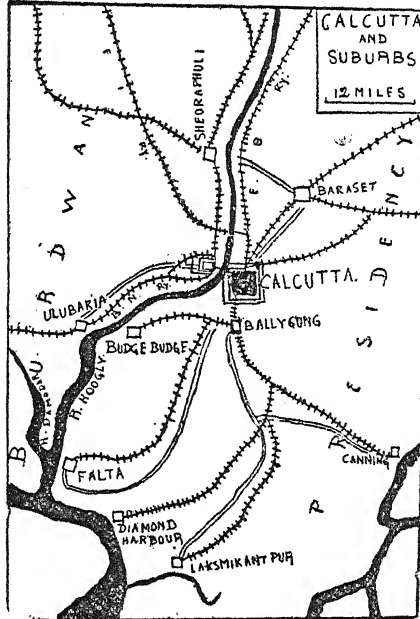


FIG. No. 72. Calcutta and its suburbs.

* The proposal for connecting the port of Calcutta with the Sea by a ship canal.

There is no deep-water harbour in Calcutta and the vessels of more than 9,000 tons have to dock at Diamond Harbour, 40 miles down Kidderpore. To increase the port facilities, it was proposed to connect the port of Calcutta with Diamond Harbour by a ship canal. This idea of a ship canal is not new, and, as a matter of fact, this proposal was examined seriously in 1945.

Apart from the question of heavy expenditure on the scheme, the main difficulty will be that many villages between Diamond Harbour and Kidderpore will have to be destroyed in the process of execution of the scheme entailing not only hardship on thousands of villagers but also loss of rice fields.

coal, iron, manganese and shellac. The principal imports are iron and steel goods, sugar, petroleum, motor car, paper, chemicals, liquor, salt, rubber and cycle. In 1947-48, the total tonnage of imports discharged in the port was about 2.5 million tons and the exports amounted to 4.5 million tons.

In 1941, the population of Calcutta was 3 million. Because of the large influx of people from Eastern Pakistan as well as of the war-time activities of the town, the population has considerably increased.

Trade Centres

Trade centres have grown in six different classes of cities in India. These are: (i) holy cities, (ii) ancient capitals, (iii) ports, (iv) health resorts, (v) manufacturing cities, and (vi) modern administrative capitals.

India is a land of *holy cities*. Banaras, Puri, Allahabad, Mathura, etc., have become important trade centres because of the assemblage of pilgrims. Some of the *ancient capitals* of India like Nagpur, Poona, Murshidabad, etc., are still important as centres of trade. *Health resorts* are mostly confined to the sea-sides and the hills where people in large numbers from the plains go for a change. *Ports and manufacturing centres* in India command the largest trade because of railways and navigation facilities. Administrative reasons have also led to the development of many towns in districts, divisions and provinces of India.

The inland trade centres of India are mainly to be found in the Indo-Gangetic plain which is favoured by two mighty rivers—the Ganges and the Brahmaputra. The industrial centres have all grown on the banks of these rivers and their tributaries or at the junctions of railways.

Another problem is the Hooghly itself. If the canal is constructed, the Hooghly will not receive proper attention. It must not be forgotten that "the Hooghly provides the only outfall channel for the rivers of West Bengal and its abandonment would only aggravate the flood menace during the rains, but that the whole area would, as a consequence, get water-logged and unproductive." The Nadia rivers are also linked up with the Hooghly, both upstream and downstream of Calcutta. Therefore, the Hooghly should be revitalised by the infusion of fresh water from the Ganges so that upstream and downstream navigability of the Hooghly may improve. The Government of India has taken in hand the *Ganges Barrage scheme* which, if completed, will make the entire length of the Hooghly navigable by bigger vessels. In that event, the port of Calcutta will develop further without having a ship canal.

The UTTAR PRADESH has an area of 110,000 sq. miles and a population of 55 million. It has made a fairly good progress in agriculture, manufactures and road development. The principal crops are wheat, sugarcane, mustard, rice and pulses. Its position in respect of minerals is not at all satisfactory. Recently its Government has entered into an agreement with the Government of Nepal for developing the Dang coalfield. A cement factory on the south bank of the river Sone in Mirzapur district is being set up. In the production of power alcohol, the State has made good progress. There are at present 9 distilleries producing $9\frac{1}{2}$ million gallons of power alcohol per annum. Two factories for the production of Rayon yarn—one near Allahabad and the other in Dehra Dun are being established. The State contains at present the largest number of sugar factories, a few cotton mills and paper and glass factories. The important trade centres are Allahabad, Banaras, Kanpur, Gorakhpur, Lucknow, Mirzapore, Moradabad, Aligarh and Agra.

Allahabad, 564 miles from Calcutta, is the principal railway centre of the U. P. It is situated at the confluence of the Ganges and the Jumna. There are several oil mills, glass factories and flour mills in the city. The trade is considerable, because the city enjoys unique advantages in regard to communication by rail, roads and rivers. Jowar and bajra, linseed, tobacco etc., are collected from the surrounding districts for export. *Banaras*, on the bank of the Ganges, is one of the biggest towns of India. The city being a place of pilgrimage to the Hindus, the pilgrim traffic is enormous. It is also an important industrial and commercial centre. Toys of wood, zarda, lac bangles, ivory articles, silk cloth, blanket sheets, linseed, mustard seed, sugar and gram are the chief articles of trade. There are several oil mills and silk factories. The place is also noted for brass-works. The famous Hindu University is situated at a distance of three miles from the city. *Kanpur* is a great collecting and distributing centre for Northern India. It is also an important railway junction of the Eastern, Western and North-Eastern Railways. It has the largest manufacturing industries in the U. P. Cotton pressing and ginning are the foremost. Sugar mills, flour mills, iron foundries, chemical works, cotton mills and oil mills are the important industries. The population of the city is over 2,50,000. *Gorakhpur* is situated on the left bank of the river Rapti. The

chief industry is carpentry. Timber is brought here from the Nepal border. The city has a large number of sugar factories. *Lucknow* is an important distributing centre for the rich agricultural produce of Oudh. The city is growing in importance rapidly. There are several railways and iron foundries. The articles of the trade are silver and gold-works, ivory and wood carving, pottery and perfumes. *Mirzapore*, an important industrial town in the U. P., is situated on a fertile tract of land on the bank of the Ganges. Carpets, rugs and silk cloths are the chief manufactures. Its stone business is also famous. *Moradabad*, the most important town of the district of Moradabad, is noted for brasswares. It has a population of 1,10,000. *Agra*, on the Jumna, is an important centre of arts and manufactures. The articles of trade are carpets, shoes, brass utensils, looking-glass frames and marbles. It is an important railway junction. It is also a collecting and distributing centre for Rajputana. The famous Taj is situated at a distance of one mile from the city. *Aligarh* is famous for its manufacture of locks and other brasswares. Bangles, glasswares and butter are other articles of importance. It is the seat of Muslim culture in India.

PUNJAB has an area of 48,000 sq. miles. Its population is a little above 13 million. The refugees from the West Pakistan form about one-fifth of the total population. The State has suffered much on account of partition since it has "received less than its due share, on population basis, of irrigated area, particularly the canal irrigated area." The main problem of the State is the problem of rehabilitation of refugees. The important trade centres are Amritsar, Ludhiana, Jullandhar and Simla. *Amritsar* stands on the main line of the Northern Railway and is 1,143 miles away from Calcutta. It is famous for its carpets and shawls. The other important industries are the manufacture of textiles, acids, chemicals, hosiery and leather. *Ludhiana* is the centre of hosiery manufacture. Ludhiana supplies turbans practically to every Indian regiment. *Simla* was the summer capital of the Government of India. It has an entrepot trade with Tibet and China. Its trade is generally busy from March to October.

MADHYA PRADESH (the *Central Provinces*) has an area of 1,30,000 sq. miles with 17 millions of people. It is one of the richest states of India in minerals. There are large deposits of coal, bauxite, iron, copper, manganese, limestone etc. No large

scale industrial use of the minerals has so far been made. Nagpur, Yeotmal, Katni, Wardha, Jubbulpore, Akola and Amraoti are the principal market places. *Akola* and *Amraoti* are the two chief centres of cotton trade. *Jubbulpore* is noted for cement, glass, lime and potteries. It has a gun-carriage factory. Its other industries are cotton textiles, brass and copper utensils, etc. *Katni* is an important centre for utensils, stones and grains. *Nagpur*, the capital of Madhya Pradesh, is a very important commercial town. It is situated at the junction of the Central Railway and the Eastern Railway. Its cotton trade is important. *Yeotmal* and *Wardha* are important cotton marts and have ginning factories.

WEST BENGAL is a densely populated province. It has an area of 28,000 sq. miles and it contains a population of more than 21 million people. Though small, West Bengal is a highly developed area. Its industrial activity, electrical development and transport facilities are of high order. Yet the economic position of this State is precarious. Its problem today is one of economic survival. The State is a deficit area and produces about 3½ million tons of foodgrains, whereas its consumption is about 4 million tons. It is dependent on Pakistan for its requirements of raw jute. It has now about 21 million acres of land under cultivation. The Damodar Valley project is expected to bring another 1·3 million acres under crops soon. Forests cover only 14 per cent. of the area in West Bengal. In industrial development, however, it is next to Bombay. It has all the jute mills, several chemical and glass works, etc. The important trade centres are Calcutta, Serampore, Berhampore, and Burdwan. *Serampore* and *Salkea* are two important industrial towns, situated near Calcutta. Both the towns possess a number of cotton mills. *Batanagar*, on the Hooghly, is a new industrial place, famous for shoe-making.

THE STATE OF BOMBAY has an area of 152,000 sq. miles with more than 24 million people. The State has developed its own resources to a great extent. It is, however, a food deficit area. The textile industry is the most important one, not only from the point of view of the State itself but also from that of the country. There is, however, much over-concentration of textile industry at two or three centres. This has created difficult social and economic problems for the industry and the centres. The trade centres are Bombay, Ahmedabad, Belgaum, Broach, Nasik, Poona and

Surat. *Ahmedabad* stands on the left bank of the Sabarmati and is 50 miles away from the head of the Gulf of Cambay. It is the second largest cotton-manufacturing centre in India. There are nearly 80 cotton mills. *Belgaum* is a silk and cotton centre. *Broach* has a large coastal trade. It is one of the oldest ports of Western India. *Nasik* is noted for brass and copper vessels. *Surat*, once an important port, is to-day famous for gold and silver thread industry. There are a few cotton mills.

In the STATE OF MADRAS the principal trade centres are ports. The State has an area of 142,227 sq. miles. *Madura* and *Trichinopoly* are the two inland trade centres. *Madura* has several weaving mills. Copper and brass vessels are also made here. In *Trichinopoly* there are many cigar factories.

DELHI, in the State of Delhi, is situated at the junction of many railway lines. It is the administrative centre of both the

State and the Republic. It is an important clearing house for the East Punjab and the western districts of the U. P. in cotton, silk and woollen piecegoods. It has several cotton spinning and weaving mills. Ivory carving, jewellery works, lace works and gold embroidery are the other important activities.

ASSAM is the most easterly State of India. It is the only State in the Republic which has two international frontiers and as such, it has much strategic importance. Two-thirds of its area

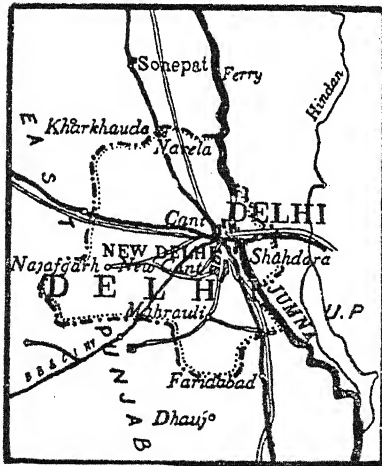


FIG. No. 73. Delhi—its environs and communications.

inhabited by aborigines who form one-third of its population. It has an area of 55,000 square miles with 10 million population. The province is rich in natural resources and holds out immense possibilities for many industries. Forests cover 40 per cent. of the total area. It has also large virgin tracts almost ready for cultivation. It is also known to be very rich in mineral wealth. "As the only internal source of oil, Assam, it

is realised, has an importance of its own for the country, but there is urgent need to explore the possibilities of further development of its oil resources." Its mineral wealth has practically not been touched. It has also a variety of minerals like limestone, glass-sand, ilmenite, abrasives and white clays. It has also vast hydro-electric resources. Agriculture is mainly confined to the Brahmaputra valley, and the principal products are rice and tea. The trade centres of the province are Shillong and Gauhati. Paper pulp is also made here. *Shillong*, the capital of Assam, is in the Khasi Hills on an altitude of 4,000 ft. above sea-level. Fruits and hill-products are the articles of trade. The population is more than 30,000. *Gauhati*, on the left bank of the Brahmaputra, is the largest town and the most important port of Assam. It has a population of more than 35,000. Gauhati is a commercial centre and handles, as a port or a railway centre, silk, tea and timber.

ORISSA has an area of 32,000 sq. miles with a population of more than 8 million. Though rich in resources, the province is very backward in industrial development. The backwardness is due to its high death rate, very low level of literacy, dependence on a single crop (rice), frequency of floods, lack of industrialisation and inadequate communications. The State, however, has substantial resources in forests, mines and rivers.

About 25 per cent. of the population consists of *Adibasis* (aborigines). The principal trade centres are Cuttack, Puri, Sambalpur and Balasore. *Cuttack*, the capital of Orissa, has a population of more than 70,000. The local manufactures comprise lac bangles, shoes, toys and combs. It also collects timber from M.P. and other places and sends them to Calcutta by the Eastern Railway. It is on the main line of the Eastern Railway and is connected by the Orissa Coast Canal with Chandbali. The city is 253 miles from Calcutta. *Puri*, a holy place of the Hindus, is an open roadstead. As the sea is shallow, the steamers anchor about 7 miles away from the shore. The local manufactures consist of brass, silver and golden ornaments. *Sambalpur* is an important silk and cotton-weaving centre.

Jaipur is the capital of Rajasthan. The city has a population of more than a lakh. It is famous for its artistic pottery and brass-wares. *Jodhpur*, in the Jodhpur State of Rajasthan, has a railway workshop and woollen and cotton mills. Stone-works are also important. *Gwalior* is the capital of Madhya Bharat and has a

population of nearly 1 lakh of persons. The name of the city is Lashkar. It has important stone-works and cigarette manufactures. The city also boasts of many cotton mills and pottery works. *Indore*, the largest trade centre of Madhya Bharat, has cotton mills, flour mills, brass-work foundries and metal-works. It has more than a lakh of population. *Bangalore*, in Mysore State, is 220 miles east of Madras. Carpets, cotton textiles, woollen goods and leather are the principal manufactures. Soap, shellac, furniture and porcelain are also made. The population is nearly half a million. *Srinagar*, the capital of Kashmir, is famous for silk, embroideries and carved woodwork. A large hydro-electric works has been installed at Buramulla to supply power to Srinagar. The city has a population of over 1,80,000. It has no railway communication, but excellent motor roads connect the city with the neighbouring areas. *Trivandrum*, in Cochin-Travancore State of the extreme south-western India, is an important industrial, commercial and educational centre. It is noted for coir fabrics, pencils, ivory works, cement and nuts.

QUESTIONS

1. What is hinterland? Give an idea of the hinterland of Calcutta and Bombay. (Cal. Inter., 1938, 1943).
2. Mention the characteristic features of the trade at each of the principal ports of India. (Indian Institute of Bankers, 1937)
3. Account for the importance of the following: Lucknow, Bangalore, Amritsar, Moradabad, Shillong. (Cal. Inter., 1939)
4. Discuss the importance of the following: Tuticorin, Ludhiana, Cawnpore, Digboi, Ahmedabad, Murshidabad. (Cal. Inter., 1940).
5. Discuss the importance of the following: Bombay, Jodhpur, Allahabad, Asansol, Delhi. (Cal. Inter., 1936, '37, '38).
6. Describe briefly the hinterland of each of the following ports, with special reference to the commodities of commerce produced and the facilities for transport provided: Bombay and Vizagapatam.
(Institute of Bankers, 1935; Cal. Inter., 1943).
7. On a sketch map of India, locate the principal ports of Kathiawar. What are the factors that have contributed to their growth?
(Cal. B.Com., 1936).
8. Discuss the commercial importance of any five of the following: Kalimpong, Dibrugarh, Cawnpore, Jharía, Vizagapatam, Nagpur.
(Cal. Inter., 1945).
9. Explain how the importance of Calcutta depends upon the extent and the productiveness of its hinterland. (W. B. C. S., 1949).

10. Discuss the commercial importance of any five of the following: Jamshedpur, Jubbalpore, Nagpur, Patna, Surat, Asansol, Benares, Bangalore (Cal. I.Com., 1948).

11. Comment on the proposal of connecting Calcutta Port with the sea by a ship-canal. Mention the disadvantages of ship-canals.

(Cal. B.Com., 1949).

12. Name four ports of importance which a ship may touch on a coastal voyage from Bombay to Calcutta. Also state the principal articles exported from these ports. (Cal. I.Com., 1948).

13 State the reasons for the growth of any five of the following: Calcutta, Bangalore, Digboi, Asansol, Jubbalpore, Kalimpong, Cawnpore, Surat, Cuttack, Benares. (Cal. Inter., 1949).

CHAPTER XIII

DOMINION OF PAKISTAN

The Dominion of Pakistan, until 14th August, 1947, a portion of India, was created because of the demand of the Muslims of India for a separate State.

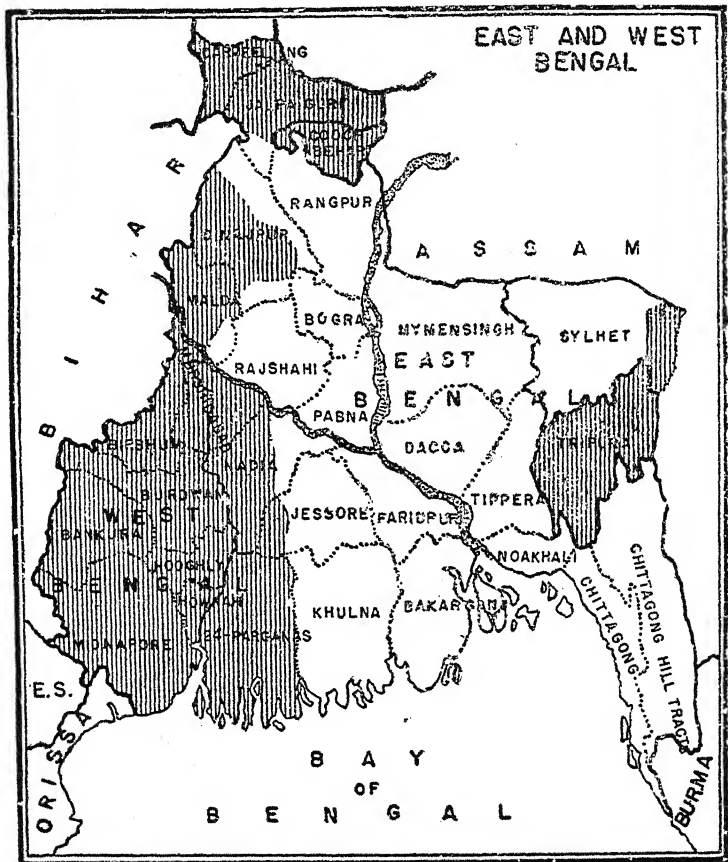


FIG. No. 74. Map showing the division of Bengal. The Eastern Pakistan comprises East Bengal and Sylhet.

The Dominion consists of two disproportionate regions—the smaller comprises the Eastern Pakistan, the larger is the Western Pakistan. The Eastern Pakistan is an *'island'* in the Indian Union and is separated from Western Pakistan by about 1,500 miles.

AREA AND SIZE

The total area of Pakistan is 364,737 square miles and it is made up of four provinces of West Punjab, East Bengal, Sind and N.W.F.P., as well as the Baluchistan and the States. The three provinces of West Punjab, Sind and N.W.F.P., as well as

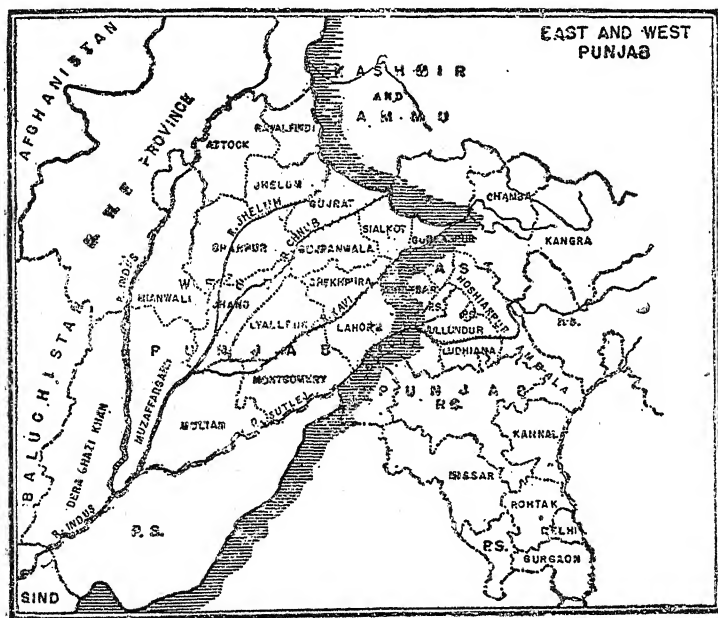


FIG. No. 75. Map showing the division of the Punjab into West Punjab and East Punjab.

the Baluchistan and the States constitute the *Western Pakistan*, while the greater part of undivided Bengal, including East Bengal, and Sylhet from the *Eastern Pakistan*. The Eastern Pakistan is about one-sixth of the total area of the Western Pakistan.

Provinces	Area in square miles
(a) <i>Eastern Pakistan:</i>	
East Bengal	49,851
Sylhet district	4,650
(b) <i>West Pakistan:</i>	
West Punjab and Bahawalpur	63,134
Sind and Khairpur	47,569
N. W. F. P.	64,256
Baluchistan and States	134,002
Federal Capital area (Karachi)	566
	<hr/>
	364,737
	<hr/>

The area of the country is a little less than that of Burma and is roughly equivalent to that of the United Kingdom and France combined.

Pakistan has a long coastline with a variety of interesting features. The Bay of Bengal is indented by a series of shallow channels and bays, while along the Arabian Sea side the coastline is relatively smooth.

Population

In 1951, the total population of Pakistan was estimated at 75·8 million. The average density of population is 195 per square mile, but its distribution is very uneven, as more than 792 people per square mile live in East Bengal while it is 6 in Baluchistan. More than 86 per cent. of the population are Muslims. The percentage of non-Muslims in East Bengal to the total population of that province is 29·17.

The distribution of population by provinces is as follows:

<i>Western Pakistan</i>	<i>In millions</i>	<i>Eastern Pakistan</i>	<i>In millions</i>
West Punjab	20·6	Baluchistan	1·1
Sind	4·1	East Bengal	39·7
N.W.F.P.	5·7	Sylhet	3·0

Racially, the peoples of Pakistan belong to different types like Indo-Aryan, Semitic, Mongol and Dravidian. The Aryan

types are pronounced in the West Punjab and N.W.F.P. The Beluchis and the Sindhis have semitic traits while in East Bengal, there has been an admixture of the Mongoloid and Dravidian strains.

The Dominion is now the fifth largest country in the world in point of population, being preceded by China, Indian Union, U.S.S.R. and U.S.A.

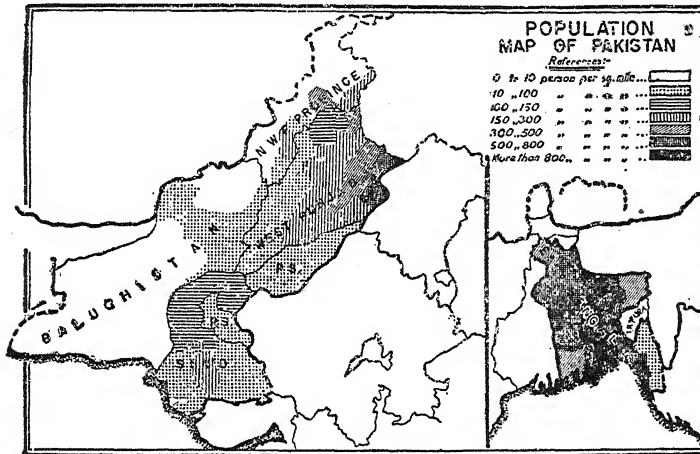


FIG. No. 76. Note the great concentration of population in the eastern part of Eastern Pakistan as well as in the canal colonies in West Punjab.

About 92 per cent. of the population live in villages as against 86 per cent. in the case of the Indian Union.

In Pakistan, the languages are Bengali (for the whole of East Bengal), Urdu (for the whole of West Punjab), Sindhi (for Sindh), and Pushtu (for N.W.F.P.)

Natural Regions

From a geographical aspect, Pakistan may be divided into six regions.

- Western Pakistan* ...
- (1) Dry Plateau.
 - (2) North Western Dry Hill Regions.
 - (3) Arid Plains.
 - (4) Deserts.

Eastern Pakistan ... (5) Wet Lowlands or New Delta Region.
(6) Ganges-Brahmaputra Doab.

The Western Pakistan has extreme type of climate. The winters are very cold and the temperature goes down below freezing point. The summer, however, is very hot and the temperature records 120°F. These extremes of temperature have bred a people remarkably hardy and vigorous, endowed with good physique, great energy and stamina.

(1) The whole of Baluchistan is a dry plateau and lies outside the influence of the monsoon. Geographically, the region belongs

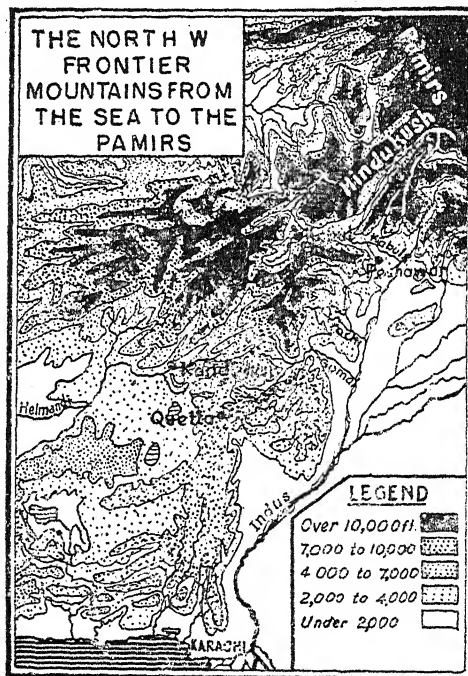
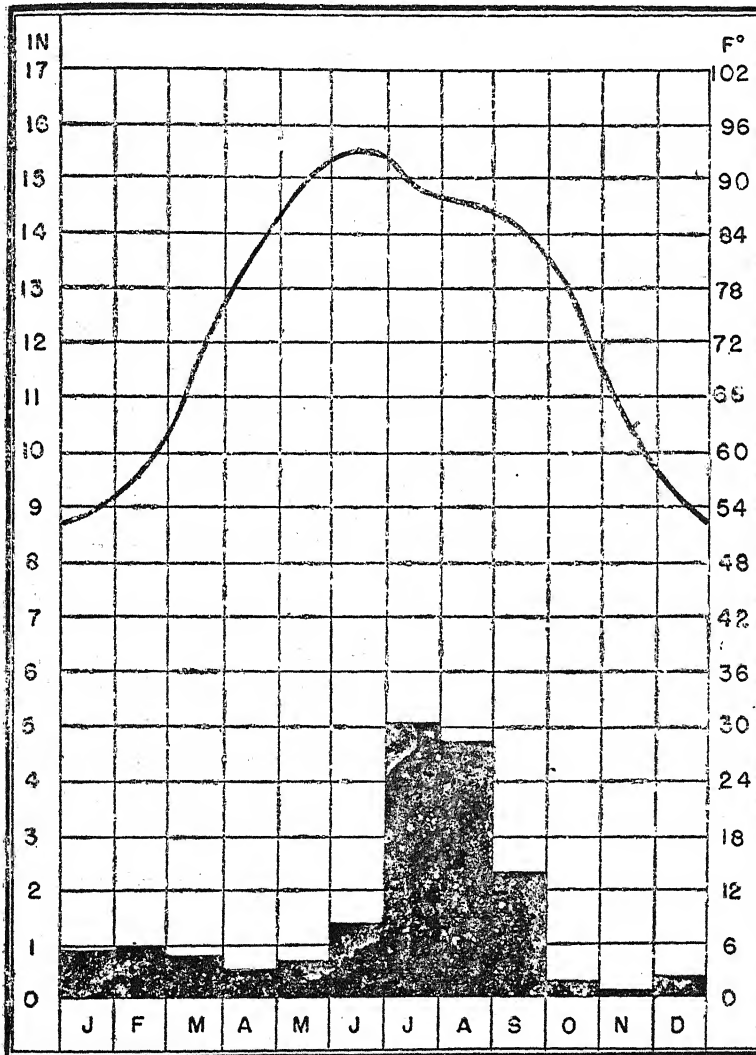


FIG. No. 77.

to the Iranian plateau. The climate is subject to extreme heat and cold, with rainfall uncertain and scanty. Due to lack of water, only a small fraction of the country is under cultivation by means of "Karez" irrigation or by flood waters from the rivers. The principal crops are millets, wheat and fodder. There is very

little surplus and whatever there may be cannot easily be exported on account of the difficulties of transport. Fruits are extensively grown. Grapes, apricots, peaches, apples, pears and melons are exported. Mulberry cultivation is also practised.



● LAHORE ●

FIG. No. 78.

(2) The North West Frontier Province and the adjoining districts of the Western Pakistan belong to the Dry Hill Regions. The rainfall nowhere exceeds 20 inches. Irrigation has been developed in the valley of Peshawar and the Bannu plain where the population is the thickest. The region is outside the influence of the monsoons and most of the scanty rainfalls in the cold season. The soil and climate are generally unsuited to the growth of large trees, but adapted to scrub jungle of a drought-resisting type. In the foot hills, the streams are dammed for irrigation purposes, while in the riverain strip, the flood waters of the Indus along with its full torrents favour agriculture. The important crops are wheat, gram and millets.

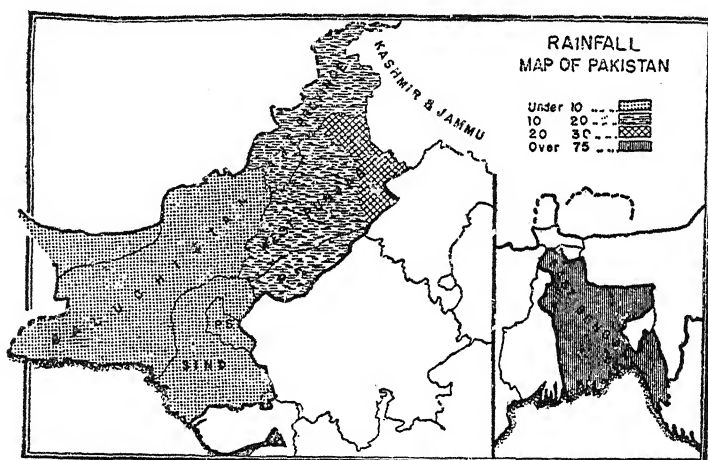


FIG. No. 79. Except in and near the N.W.F.P., the West Pakistan is a zone of very low rainfall: The greater part of the farming depends on irrigation. East Bengal is an area of very heavy rainfall, the overall annual average being over 75 inches.

(3) The plain encompasses the valleys of the Indus and its tributaries and covers the whole north-eastern and south-western and the southern portions of the Western Pakistan. The plain is drained by the five rivers Jhelum, Chenub, Sutlej, Ravi and Bias—all of which join the Indus. The north-eastern plain is damper and grows crops without irrigation. The rainfall is between 10/20 inches. The western plain is very dry and all crops are dependent on irrigation.

The southern portion is a dry alluvial plain stretching from the edge of the Baluchistan plateau to the Thar desert on the east. Agriculture is developed with irrigation along the Indus Basin. The rainfall is less than 10 inches.

(4) The desert covers the south of the Sutlej and the eastern portion of Sind. The region is really speaking the western part of the *Thar* desert. The rainfall is less than 5" a year.

(5) East Bengal is a new deltaic region. Every year huge quantities of silt are brought down by the rivers. During the monsoon period, a great part of the region is flooded, and a rich deposit of silt is spread over the country. This region is a land of rivers, and there are few roads. The rivers thread their way across the region and eventually flow towards the Bay of Bengal.

It has monsoon type of climate with high temperature and humidity in summer and cool winter. During the cold months of November to February, the mean temperature is 64°F and in summer the temperature is 84°F. The rainfall is more than 75 inches everywhere, and soil is very fertile. Rice, sugar-cane and jute are the principal crops. East Bengal produces sub-tropical fruits like mangoes, pineapples and bananas.

(6) North Bengal is really a portion of the Ganges-Brahmaputra Doab. The surface is usually flat, broken here and there by low hills.

Irrigation

Pakistan with her 30 million acres of irrigated land occupies the second position in the world in respect of canal irrigation. The importance of irrigation in the case of Western Pakistan can hardly be exaggerated. In the Western Pakistan, the rainfall is not only uncertain but also varies from year to year. The rainfall is under 10 inches in the whole of Sind and Baluchistan, while it is between 10 to 20 inches in West Punjab and the N.W.F.P. Only the extreme eastern part of West Punjab receives more than 20 inches rainfall.

"One year in five may be expected to be a dry year, and one in ten a year of severe drought." The Western Pakistan, therefore, depends, to a great extent, for cultivation on the irrigation works. About 34 per cent. of the cultivated area of Pakistan is irrigated compared to 18 per cent. in the Indian Union.

The Western Punjab is a canal colony because the conditions are excellent for developing irrigation. The Indus and its tributaries spread out over the province like the fingers of an open hand. With the exception of the North-West, the province is flat with soft alluvial soil. The development of canal irrigation has transformed the Lyallpur and Montgomery districts, which were more or less like semi-deserts, into fertile agricultural lands. About 14 million acres of land are irrigated by canals in Western Punjab.

(a) The largest irrigation work is the Lower Chenub Canal. It has 2,437 miles of channels and irrigates more than 2 million acres of land of the Lyallpur colony. It takes its water from the Chenub at Khamki and has turned a semi-desert tract into a rich agricultural area around Lyallpur, where population has increased with great rapidity after the opening of the canal system. Before

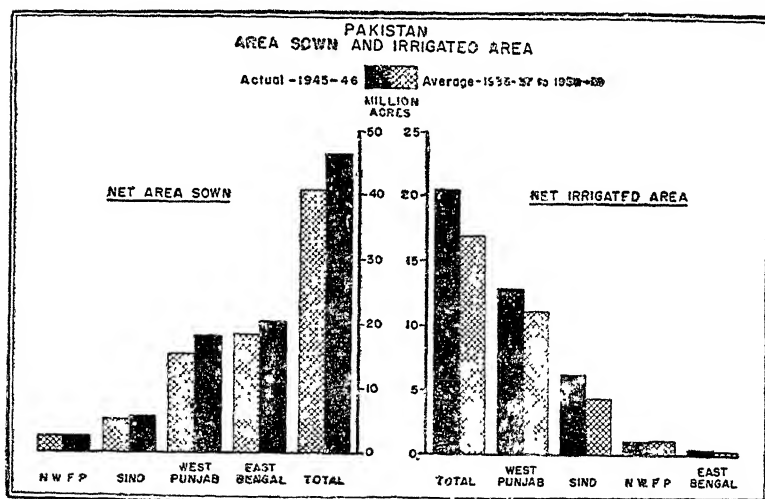


FIG. No. 80. Note the importance of irrigation in the West Punjab and Sind.

its construction, the density of population in this area was very sparse and never exceeded 10 people per square mile. At present there are more than 300 people per square mile. In winter months, the Chenub is dry below Khamki. The percolation of water, however, into the Chenub below the headwork is consi-

derable and there is appreciable supply of water at the junction of the Chenub and the Jhelum.

(b) The Lower Jhelum Canal has 583 miles of channels and

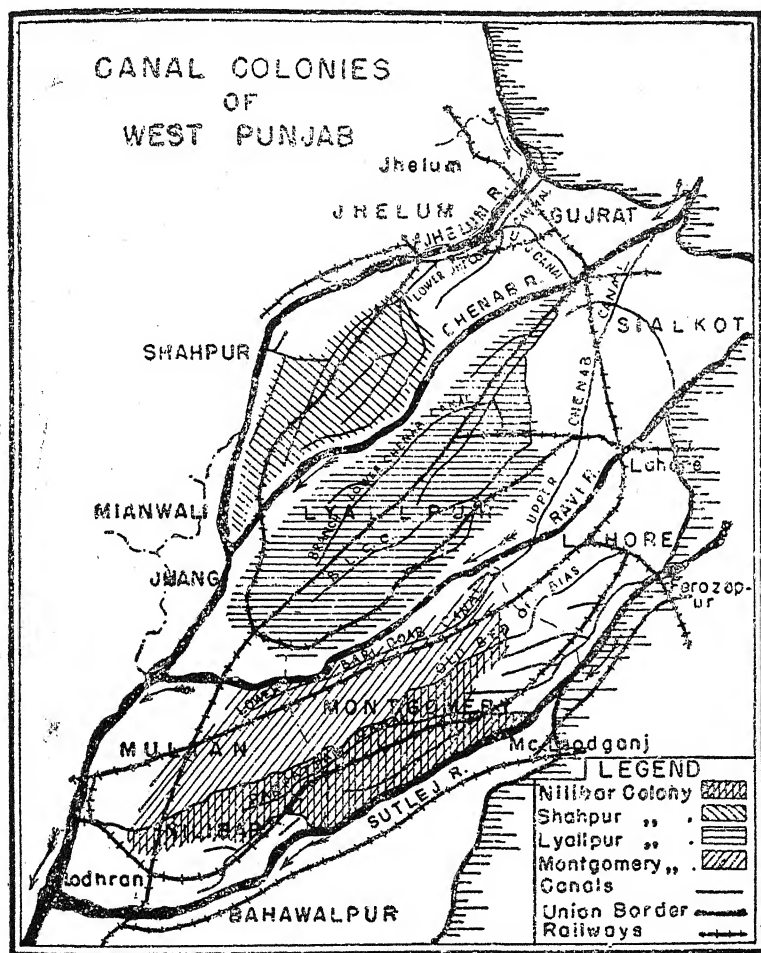


FIG. No. 81. The amount of water available varies from canal to canal and is limited by the water supplies of the rivers from which the canals off-take. The water of the Jhelum river can be switched into the Chenub *via* Upper Jhelum feeder and the water of the Chenub can be switched into Ravi *via* the Upper Chenub feeder. The Lower Bari Doab Canal although taking out of the Ravi is entirely dependent on the Chenub for its supplies. It may be mentioned in this connection that the head works of the U.J.C., U.C.C., U.B.D.C., and the Sutlej system are in the Indian Union.

irrigates more than 8,60,000 acres of land of the Shahpur Colony in West Punjab. The head-stream is at Rasul on the border of Kashmir State. In winter months the Jhelum is almost dry below Rasul.

(c) The Upper Jhelum Canal takes its water from the Jhelum at Mangla in Kashmir and irrigates Gujarat lying between the Upper Jhelum and the Upper Chenub. The canal was opened in 1915.

(d) The Upper Chenub Canal takes its water from the Chenub at Marala in Kashmir and joins the Lower Bari Doab Canal at Balloki on the Ravi. The canal was opened in 1912. The canal serves Sialkot, Gujranwalla and Sheikhpura.

(e) The Upper Bari Doab Canal which has its headworks at Madhopur and passes through Amritsar district in the Indian Union, also irrigates Lahore and Montgomery districts. This canal is one of the oldest and most important in the undivided Punjab.

Most of the head-streams as well as the sources of the Punjab canals are in the East Punjab or Kashmir.

Mention may be made of the *Triple Canal Project*—a magnificent engineering work. The lower Bari-Doab Canal does not possess sufficient water, because the Upper Bari-Doab Canal in East Punjab takes away much water from the Ravi at Madhopur. The Upper Chenub Canal has, therefore, been connected with the Lower Bari-Doab Canal at Balloki. Again, owing to the existence of the Upper Chenub Canal, the Lower Chenub Canal does not possess sufficient water. By a bold engineering conception, the Upper Jhelum has now been connected with the Lower Chenub at Khamki. The entire project was completed in 1933. The total area irrigated by the Triple Project is about 4 million acres.

In Bahawalpur State, there are three canals, namely, the Bahawal Canal, the Fordwan Canal and Sadiquia Canal—all taking off from the Sutlej. In Bahawalpur an irrigation scheme is being implemented which will bring 260,000 acres of land under cultivation very soon.

An area of nearly six million acres, that is, more than 74 per cent. of the total area sown in Sind is irrigated by canals.

The Lloyd Barrage Scheme is one of the marvels of engineering science. A great dam has been constructed across the Indus river by putting a mile long barrage at Sukkur in order to control the waters of the river; from the dam, water is distributed by means of seven large canals to different areas of Sind. Two largest canals are the Eastern Nara (226 miles) and the Rohri (208 miles). The total discharge of water into all the canals is approximately 285,000 gallons a second. The total length of all irrigation channels is 54,000. The upper Sind which is not served by the Lloyd Barrage System has three canal works—(a) the Desert Canal, (b) the Begari Canal and (c) the Unhar Wah Canal. The Lower Sind has two canals—(a) Karachi Canal and (b) Fuleh Canal.

In N.W.F.P. about 400,000 acres of land are now being irrigated by canals which take off from the Swat. The upper Swat System was opened in 1914 and now serves about 70 per cent. of the irrigated area of the province. There is great scope for further development of canal irrigation in the Western Pakistan. Four irrigation projects are already being worked out—two in the West Punjab and two in Sind. Besides, the Government has planned two multipurpose projects—one at Warsak in the N.W.F.P. and the other at Rasul in West Punjab. All these projects will make available a further twelve million acres of land for cultivation.

The Warsak Multipurpose Project of the North-West Frontier Province will develop 100,000 Kw. of energy and provide facilities for irrigation to 60,000 acres of land in the Peshawar district and several thousand acres in the Tribal areas, including a portion of the Khajuri plain, outside Jamrud. The project will enable the Kohat Valley to construct tube-wells for irrigation. The Warsak will supply power for working the Mullagori marble mines, four miles from Warsak dam, coal deposits in the Cheral hills near Peshawar and in the Kohat district, gypsum in Kohat, copper ore in the Mohmand country and subsidiary industries. It will also provide, by means of canal navigation, communication between N.W.F.P. and West Punjab.

Wells are being introduced for irrigation in the Western Punjab. Small power-pumps are used in well-irrigation, particularly in the districts of Lyallpur, Jhang, Sheikhpora and Sargodha. Mention may be made of "Karez", an underground system of

irrigation which is extensively practised in Baluchistan. Here the soil is open and porous and is composed of water-worn stones ; but below the surface the soil is hard, impermeable and conglomerated. Therefore, water is found flowing in many places below 20 or 30 feet from the surface, although on the surface itself there is no water. The water thus found is led gradually towards the surface through the Karez. A series of wells are dug at intervals of 15 to 25 yards, and connected below by an underground passage, through which the water runs till at last it reaches the surface and is utilised for irrigating the fields.

Agriculture

Agriculture is the most important industry in Pakistan, as more than nine-tenths of the population depend on it for their living. Agriculturally, six zones can be distinguished in Pakistan : (a) Sub-Montane—N.W.F.P., (b) North-Eastern plains of Western Punjab, Gujarat and Sialkot, (c) North-West Punjab—Rawalpindi, Jhelum, Attock, Mianwali, Peshawar, Kohat and Bannu, (d) South-Western plains of the Western Punjab—Gujranwalla, Lahore, Lyallpur, Montgomery, Multan, Bahawalpur, Dera Ghazi Khan and Dera Ismail Khan, (e) Lower Sind, (f) East Bengal. Out of 150 million acres of land in Pakistan, about 45 million acres are at present cultivated, the remaining being uncultivated.

The principal crops are wheat, rice, maize, sugar-cane, tea, jute, cotton, oil-seeds and tobacco. "Pakistan is an agricultural surplus area which can feed its own people, export some wheat and a great deal of cotton and jute."

The great mass of the population are engaged in agriculture. A scheme is being drawn up for the mechanisation of cultivation in the Dominion on a co-operative basis. This will improve the lot of the farmers and increase the output. Mechanised cultivation has already begun in certain areas of West Punjab. In Baluchistan, mechanised cultivation will be concentrated on fruit cultivation. Mechanisation of agriculture will not be necessary in Sind as the completion of the lower and upper Sind barrage will automatically increase cultivation in the province. The Chengri Valley of the Chittagong Hill tracts is being developed for mechanised cultivation. At present the delta region of the Eastern Province of

Pakistan is full of diseases and lying almost uncultivated. This region will soon be brought under cultivation with the help of modern farming methods through the efforts of the World Health Organisation and the Food and Agricultural Organisation.

Food crops occupy about 85 per cent. of the total cultivated area of Pakistan. About half of this area is in Eastern Pakistan. Pakistan does not require any more expansion in the food crop cultivation but she requires a switch over from food crops to cash crops which will command greater economic value both at home and abroad.

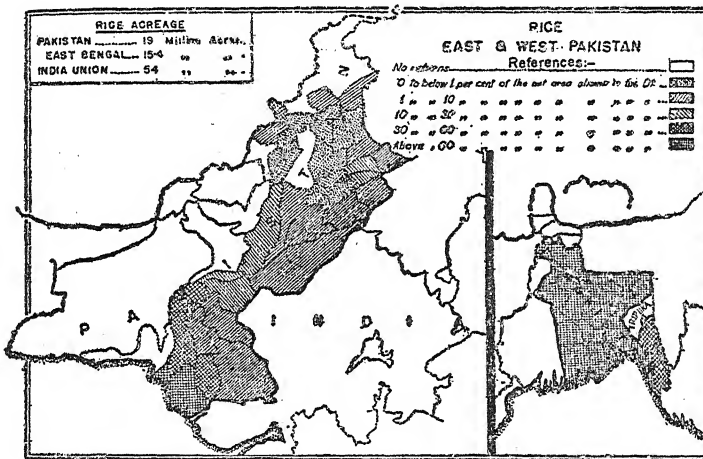


FIG. No. 82. Note the great concentration of cultivation in East Bengal where more than 60 per cent. of the sown area accounts for rice.

The total area under foodgrains in Pakistan is normally about 35 million acres with a production of about 12 million tons. Of this, about 23 million acres are under rice with a production of nearly 8 million tons and 10 million acres under wheat with an aggregate output of 3 million tons. The remaining acreage is under maize, millets and barley. Thus taking all foodgrains together and after providing for seeds, wastage and farm stocks, Pakistan has a surplus of 4 lakh to 5 lakh tons of foodgrains in a normal year.

YIELD AND AREA UNDER FOOD CROPS* (1950-51)

		Area (000 acres)	Yield (000 tons)
Rice	...	22,401	8,195
Wheat	...	10,832	3,953
Jowar	..	1,265	238
Bajra	..	2,327	355
Maize	...	942	368
Barley	...	571	161
Gram	..	2,831	743
Sugarcane	..	700	874
Edible oil seeds	...	1,827	301

Rice : It is the staple food of the people of Eastern Pakistan. About 23 million acres of land are under rice, of which East Bengal alone possesses 20 million acres. Sind and Sylhet have 3 million acres in total under rice, while West Punjab has little above half million acres. In every district of Eastern Pakistan rice accounts for more than 60 per cent. of the sown area.

Pakistan raises 8.2 million tons of rice annually to which Eastern Pakistan contributes 7.0 million tons. Normally the Eastern Pakistan is a deficit area in rice by about 300,000 tons and the deficit is met by supplies of rice from the Western Pakistan.

There are now 84 rice mills in Pakistan, all of which are located in East Bengal.

Wheat : It occupies 10 million acres of land and gives a yield of more than 3 million tons a year. It is mostly grown in the West Punjab, Sind and N.W.F.P.

* India-Pakistan Year Book, 1952.

WHEAT: AREAS AND PRODUCTION (1950-51)

Provinces/States	Yield (000 tons)	Area (000 acres)	Provinces/States	Yield (000 tons)	Area (000 acres)
West Punjab	3,007	7,293	Sind	289	1,202
N.W.F.P. ...	265	1,101	States	320	888

Wheat is cultivated in Western Pakistan in the months of November and December and is harvested in May. The average yield of wheat per acre in the West Punjab is 700 pounds and in Sind 600 pounds. The districts of Muzaffar Garh, Attock, Jhelum and Sialkot in the West Punjab have each between

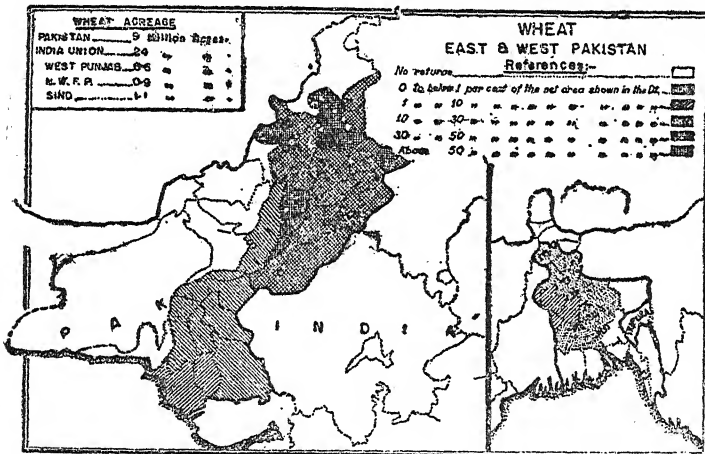


FIG. No. 83. In West Punjab, every district has more than 30 per cent. of the sown area under wheat.

50-60 per cent. of the net cultivated area under wheat. In Eastern Pakistan the monsoon discourages wheat cultivation although in small quantities it is raised in Rajshahi, Pabna and Kusthia. The Western Pakistan is a surplus area in wheat and has, therefore, an exportable surplus.

A little quantity of *barley* is also grown in Pakistan, most of which comes from the N.W.F.P. The districts of Mardan and Peshawar have nearly half the total provincial area under barley.

Barley occupies about 571,000 acres of which Punjab has 288,000 acres and N.W.F.P. 138,000. The other food crops of Pakistan are *Maize*, *Pulses* and *Gram*. Maize is extensively grown in the West Punjab and N.W.F.P.

In 1952, about 1 million acres of land were under maize in Pakistan. West Punjab and N.W.F.P. share equally in acreage. The average annual production is about 400,000 tons.

In West Punjab, the districts of Rawalpindi, Attock, Jhelum, and Gujarat have the largest acreage under maize. Recently, the acreage under maize has also increased in Sheikhupura, Sialkot and Gujranwalla. In Sind, maize-producing districts are Sukkur and Hyderabad.

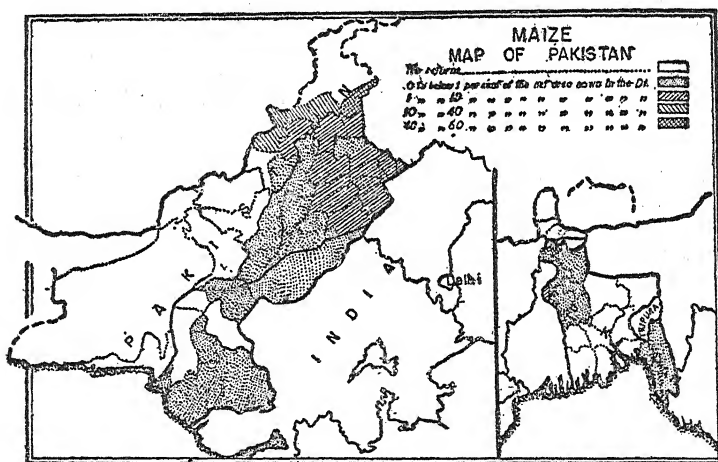


FIG. No. 84. The central region of the N.W.F.P. and the northern area of West Punjab have the greatest acreage under maize.

Gram covers approximately 3 million acres, of which 98 per cent. is in West Punjab. Small quantities are also raised in Sind, North West Frontier Province and East Bengal. The Dominion produced 500,000 tons of gram in 1952. Although gram is cultivated in almost every district of West Punjab, the largest acreage under this crop is found in Shahpur, Montgomery and Multan.

GRAM-AREA

PAKISTAN

(Thousand acres)

Provinces/States		Average 1936-37 to 1938-39	1944-45	1951-52
East Bengal	...	101	283	221
N.W.F.P.	...	155	236	216
Sind	...	335	403	454
West Punjab	...	1,022	1,887	2,034
Khairpur	...	20	30	22
Total Pakistan	...	1,633	2,839	2,813

The position of Pakistan in the matter of foodgrains is on the whole satisfactory. There is a large surplus of wheat and small surplus of rice in the Western Pakistan. Thus the deficit of food in Eastern Pakistan can be met by the Western Pakistan.

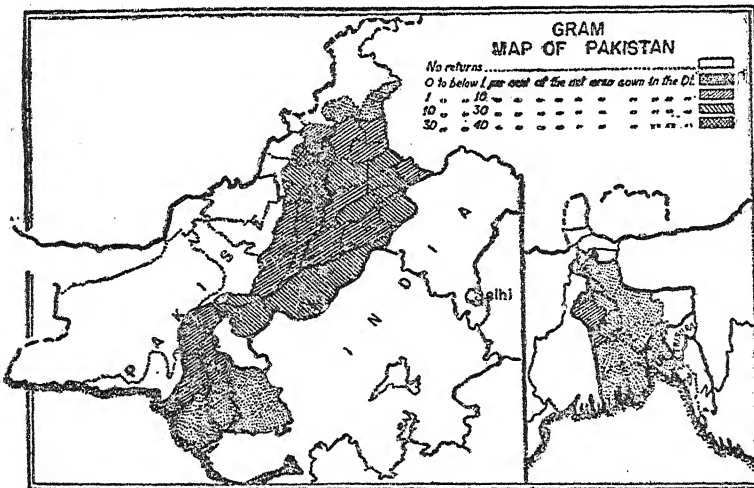


FIG. No. 85. The cultivation is confined to the valleys of the Indus and its tributaries.

With improved agricultural methods, extended irrigation, more capital and better communications, the Western Pakistan would be able to support a population larger than its present size.

Sugar-cane is cultivated in an area of 700,000 acres of land in Pakistan. The cultivation is mostly confined to the Western Punjab and Eastern Bengal. The sugar-cane tracts of the Western Punjab are Montgomery, Lyallpur, Sialkot and Lahore. In Eastern Bengal the producing districts are Dinajpur, Rangpur, Dacca and Mymensingh. The total production of sugar is only 25,000 tons. The Dominion will have to depend for many more years on imported sugar.

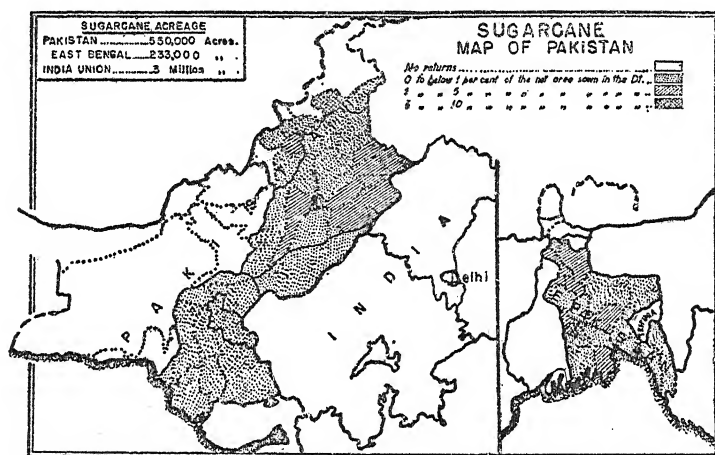


FIG. No. 86. Note the great concentration of sugar cultivation in N.W.F.P., canal colonies in the West Punjab and Mymensingh in East Bengal.

SUGARCANE-AREA

(Thousand acres)

PAKISTAN

Provinces/States	Average 1936-37 to 1938-39	1944-45	1951-52
East Bengal ...	256	254	226
N.W.F.P. ...	64	96	82
Sind ...	7	6	17
West Punjab ...	194	251	335
Total Pakistan ...	521	607	728

Tobacco : Tobacco is an important cash crop of Pakistan. It is mostly grown in East Bengal. The chief districts are Rangpur, Dinajpur and Chittagong. About 15 per cent. of the sown area in Rangpur is occupied by tobacco.

AREA AND PRODUCTION

		Average 1936-39		1951-52	
		Thousand acres	Thousand tons	Thousand acres	Thousand tons
East Bengal	...	279	118		
West Punjab	...	48	18		
N.W.F.P.	...	18	11		
Sind	...	5	2		
States	...	1	1		
All Total		351	150	179	75

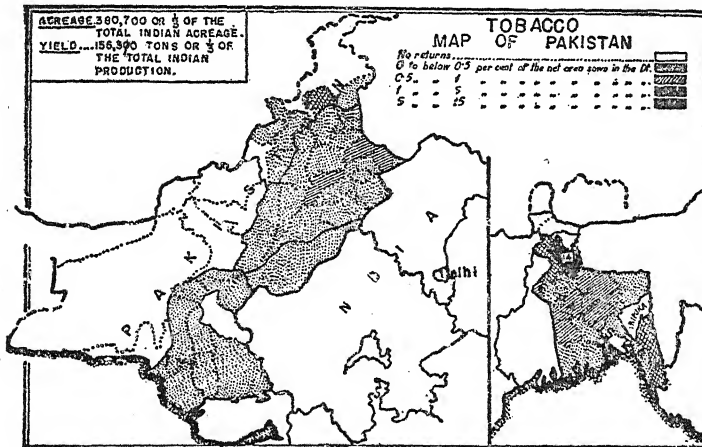


FIG. No. 87. Note Rangpur in Eastern Pakistan and Sialkot in the West Punjab are the two important tobacco-producing districts.

Tea : It is also an important product in Pakistan. Its cultivation is confined to Sylhet and Chittagong hill tracts. The annual production of tea is about 45 million lbs. compared to 405 million lbs. in the Indian Union. At present there are 130 factories in Eastern Pakistan, of which 109 are in Sylhet and 3 in Chittagong. About 83,000 acres of land are under tea cultivation in Pakistan. Tea is chiefly exported to U. K. Pakistan had joined the international tea agreement early in 1949 for a period of two years. Pakistan's standard acreage under the agreement is fixed at 76,700 acres, and the export quota at nearly 35 million lbs.

Pakistan exports about 50 million lbs. of tea yearly. The United Kingdom, which is one of the best customers of Pakistan tea, imported 28 million lbs. of tea in 1948-49.

Tea is mainly exported through Chittagong. As the export seasons of jute and tea are the same, there is always a great rush for loading at Chittagong ; consequently Chittagong with its normal capacity of only 600,000 tons per annum cannot cope with the traffic. Another problem of the tea industry is the shortage of tea chests.

AREA UNDER TEA IN PAKISTAN

(Thousand acres)

Provinces/States	Average 1936 to 1938	1943	1951-52
East Bengal ...	56,342	76,771	83,000
Total Pakistan ...	56,342	76,771	83,000

In 1952-53 tea production was 53 million lbs. in Pakistan.

Cotton*: It is the most important industrial crop of Western Pakistan, although produced in every part of the Dominion.

Thus Western Pakistan raises about 97 per cent. of the Dominion's cotton. Multan, Montgomery, Lyallpur, Shahpur, Lahore, Sheikhpora and Jhang districts account for 90 per cent. of the cotton production of West Punjab. In each of these districts cotton occupies 20 to 30 per cent. of the sown area.

* From time immemorial cotton has been cultivated in the Indus valley as the evidence was found in the presence of cotton fabrics in the excavations of Mehengo Daro of the days of prehistoric civilisation.

COTTON: AREA AND PRODUCTION (1950-51)

Provinces		Thousand acres	Thousand bales of 400 lbs. each
West Punjab ...	...	1,713	625
Sind ...	...	813	450
States ...	...	419	194
N. W. F. P. ...	...	11	3
East Bengal ...	...	1,250	18
Total ...		3,011	1,920

Recently both production and acreage have considerably declined. The lower production is due to decline in exports of

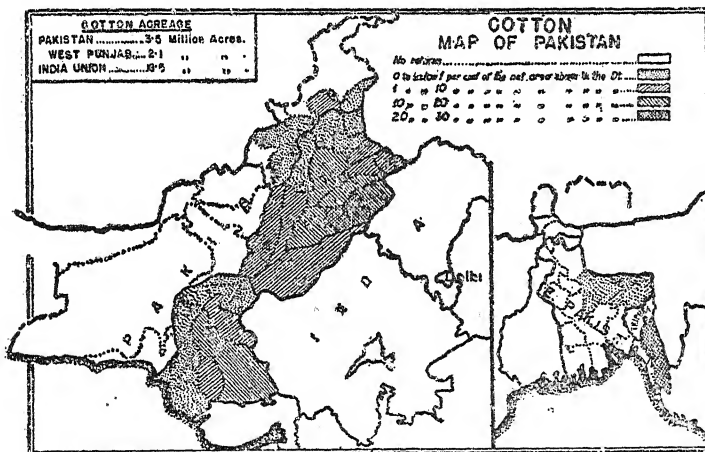


FIG. No. 88. Note the greater concentration in the eastern parts of West Punjab and Hyderabad District in Sind.

raw cotton. Indifferent quality and high prices are at present responsible for this decline. With a view to encouraging the export of cotton, the Government has lowered the export duty on short-stapled cotton.

Sind has cotton tracts in the districts of Tharparkar, Hyderabad and Nawabshah which contribute about 95 per cent. of total provincial production.

Two types of cotton are grown in Pakistan—the Desi and the American. American cotton is raised in the West Punjab and Sind, which are watered by a perennial canal system and where the climate has plentiful moisture. Such plants need about 7 months of growing season during which time there must be no risk of frost. At present the American varieties account for 80 per cent. of the total production. About four million acres of land are under cotton cultivation in Pakistan and the yield is two million bales (of 40 lbs. each). American cotton occupies about 75 per cent. of the total acreage. Pakistan is in a position to export about 80 per cent. of her cotton mainly to the Indian Union.

Jute : Pakistan holds a dominant position as a producer of raw jute. About 80 per cent. of the total world production of jute comes from Eastern Bengal. About 1·2 million acres of land are under jute cultivation in East Bengal which is about 8 per cent. of the cultivated area.

PAKISTAN *vis-a-vis* WORLD PRODUCTION OF JUTE

(in 000 metric tons)			
Average		World	Pakistan
1935-39	.	1510	1125
1940-44		1635	1257
1945 ...	.	1475	1121
1948 ...	...	1578	1242

In 1951, Pakistan raised 4·4 million bales of raw jute.

The moist climate of East Bengal is an ideal one for the growing of jute. The quality and quantity of fibres, however, depend on soils. Jute plant in East Bengal is grown in three different kinds of soil:—(a) the rich sandy loams of the highlands which produce the finest qualities of jute; (b) the *Char lands*, i.e., alluvial soils which are situated in the neighbourhood of the river tracts, and which are flooded during the rainy season; such lands do not require manure; (c) the marshes or low-lying tracts on the deltas of the rivers.

The commercial division of the jute tracts in East Bengal is as follows:—

1. Naraingunj.
2. Serajgunj.
3. Uttarya or Northern.
4. Dewrah.

'Naraingunj' jute is grown on the old Brahmaputra river valley in the districts of Mymensingh, Dacca and Tipperah. There is no other jute tract in East Bengal where water is so clear as that of the old Brahmaputra. Most of the tracts lie under flood water when the jute crop is still on the fields and, consequently, the fibre becomes 'rooty' and 'mossy'. Naraingunj jute is thus considered best in the market.

'Serajgunj' jute comes from the basin of the new Brahmaputra or Jamuna river in the districts of Pabna, Bogra, Rangpur and Western Mymensingh. The water of the Jamuna is nearly as clear as the old Brahmaputra.

'Uttarya' or Northern Jute is obtained from the highland tracts in the districts of Rajshahi, Bogra, Rangpur, Dinajpur and Malda. The areas are supplied with water from the tributary rivers of the Brahmaputra. As only a limited part of the tract receives a direct supply of water from the river, the jute is to be steeped and washed in ditch-water. The colour of the jute is inferior because the ditch-water which is used for successive steeping becomes coloured.

'Dewrah' jute is grown in tracts watered by the branches of the river Ganges in Faridpur district. This jute is very strong but harsh and is suitable for making cordage and sackings.

Mymensingh alone raises more than 70 per cent. raw jute of Eastern Pakistan. The time for sowing is mid-February to mid-April and harvesting commences in mid-June and continues till early September. *The average yield of jute per acre is 1203 lbs.* In 1947-48, the yield per acre was 1329 lbs.—highest so far recorded in the world. About 2 million acres of land are under jute cultivation in East Bengal. The annual yield of raw jute is about 69 million bales (of 400 lbs. each). Jute cultivation is a very profitable occupation to the peasants in Eastern Pakistan who depend very much on it for their prosperity. There is not a single Jute mill in Pakistan. The present arrangements for the baling of raw jute are also unsatisfactory. Consequently, the greater part of the jute crop is sent to be processed to the Indian Union from where again the produce is exported outside.

The total export of raw jute from East Bengal in 1952 amounted to 4.6 million bales. Of this 4.1 million bales were exported to Calcutta by steamers and country boats. The share of Chittagong in the total jute export was only 51,400 bales. The

Government is taking steps to develop Chittagong so that the port may handle a large volume of export trade. There are at present neither marketing nor warehousing facilities available in Chittagong.

Many countries in view of recurrent jute shortages and the practical monopoly of this product held by East Pakistan have made experiments with substitutes. Belgian Congo cultivates *Urena Lobata* (a wild fibre plant indigenous to all tropical Africa)

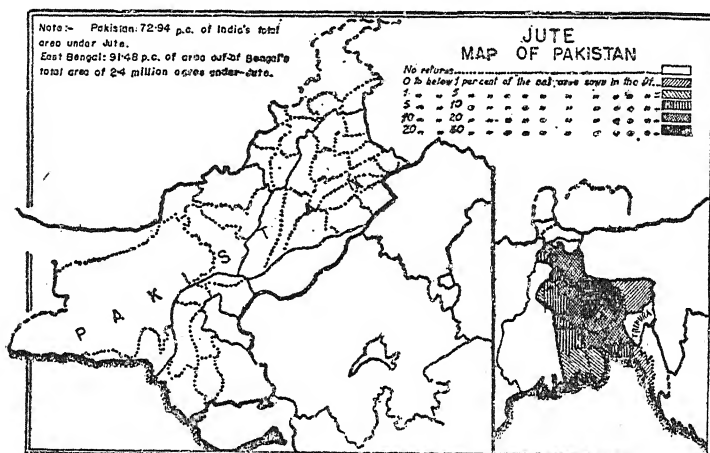


FIG. No. 89. Jute—a product of East Bengal. Mymensingh and Dacca are the chief jute-producing districts.

and has achieved an annual production of several thousand tons. A factory for making sacks from this fibre has just been established at *Leopoldville*. A similar but less good quality fibre is that known locally as *punga*. Production of these two fibres in Congo is to be stepped up during the ten-year plan from the present level of 11,000 tons to 24,000 tons per annum. Java has become almost self-sufficient so far as sugar bags are concerned by cultivating extensively a jute-like fibre called *Rosella*. A similar fibre called *Kenaf* is grown in Manchukuo and is used for making bags for soya beans. *Manila hemp* in the Philippines and *Polompon* in Indo-China are similar to jute. The production of such jute-like fibres may affect the jute cultivation of East Pakistan.

The most outstanding landmark in the history of jute in

Pakistan has been the establishment of a Pakistan Central Jute Committee in August, 1950. The Committee undertakes agricultural, technological and economic research, improvement of crop forecasting and statistics, production testing and distribution of improved seeds, enquiries and recommendations relating to banking and transport facilities and the improvement of marketing in the interest of the jute industry.

Oil-Seeds : About 1·8 million acres of land are under oil-seeds cultivation in Pakistan as compared with 20 million acres in India. East Bengal is better placed in respect of oil-seeds, though the quality is inferior. The important oil-seeds are rape and mustard, sesamum and linseed.

AREA AND PRODUCTION OF OIL-SEEDS: (1951)

(Sesamum, groundnuts, rape and mustard, linseed and castor seed)

	Rape & Mustard		Sesamum		Linseed	
	Area	Yield	Area	Yield	Area	Yield
	(000 acres)	(000 tons)	(000 acres)	(000 tons)	(000 acres)	(000 tons)
East Bengal	488	89	144	27	60	9
West Punjab	360	69	30	3	6	1
Sind	324	47	15	2	—	—
N. W. F. P.	93	7	2	—	—	—
States	287	62	10	2	—	—
	<hr/> 1,626	<hr/> 278	<hr/> 201	<hr/> 34	<hr/> 66	<hr/> 10

Linseed is mainly grown in East Bengal where 68,000 acres of land are under this crop, out of Pakistan's total of 74,000 acres.

Forests

Forests cover about 5 million acres of land in Pakistan, which, in terms of percentage, is only 1/20 of the total area.

Sind and North West Frontier Province are hardly forested, as these are mostly arid areas. The position of the West Punjab is no better, about 2 per cent. of area being covered by forests. The Eastern Pakistan has, however, considerable areas under forests along the southern coast as well as in Chittagong. But then the forest districts of East Bengal are not continuous. The major district is in the north-east comprising Mymensingh and Sylhet while the next one is in Chittagong along south-east of

the East Pakistan. Thus Pakistan forest resources are much less than its requirements and a suitable forest policy is required to meet the situation.

AREA UNDER FORESTS IN PROVINCES (1945-46)

(In thousand acres)			
East Bengal	... .. 3117	N. W. F. P.	... .. 353
Sind	.. .. 716		—
West Punjab	... .. 1149	Total	... 5335

The principal trees which yield timber are the following:

- (i) Babul in Sind, Baluchistan and the West Punjab.
- (ii) Blue pine in North West Frontier Province and the West Punjab.
- (iii) Gurjan in East Bengal, used for boat-building and packing cases.
- (iv) Gamari in East Bengal used for boats, buoys and packing cases.
- (v) Sundri in East Bengal.
- (vi) Bamboo is an important plant throughout the eastern part of East Bengal and serves a number of uses. It grows abundantly in Noakhali, Tipperah, Mymensingh, Sylhet and Chittagong. As the price of bamboo is very cheap, its use in villages has become common for framework, walls and roofs of houses.

No statistics have been so far gathered as regards Pakistan's forest growth, drain and requirements and potential productivity of forest lands.

Mineral Products

The present position of Pakistan in respect of mineral wealth is not very satisfactory, although she is endowed with diversified mineral wealth. Her great unexplored areas, however, afford promising fields. Till proper surveys are undertaken and new fields discovered, Pakistan will have to depend on foreign sources for basic minerals of industrial value. The Dominion does not now produce iron ore, manganese, monazite, copper, mica and bauxite. Several areas are now under examination, and it may be possible to get *iron deposits* in the North West Frontier Province, *manganese* in Chitral, Kohat and Baluchistan, *copper* in Baluchistan, Chitral and Waziristan, *mica* in Hazara district, West Punjab and Baluchistan and *bauxite* in Baluchistan. Sub-

stantial *deposits of coal of good quality* are reported to be lying below 250 feet in Baluchistan and West Punjab. Experiments in laboratories show that this coal though not fit for use in boilers and allied purposes, is rich in many other valuable properties. The production of sulphur, coal gas and distillation products extracted from this coal hold out promise for immense industrial development. In addition to this, coal bricks and coke bricks can also be produced from West Punjab coal which can be respectively used in boilers and for domestic purposes.

The mineral situation in Pakistan will demand serious consideration of the authorities. The country is in a somewhat anomalous position in that most minerals of industrial importance

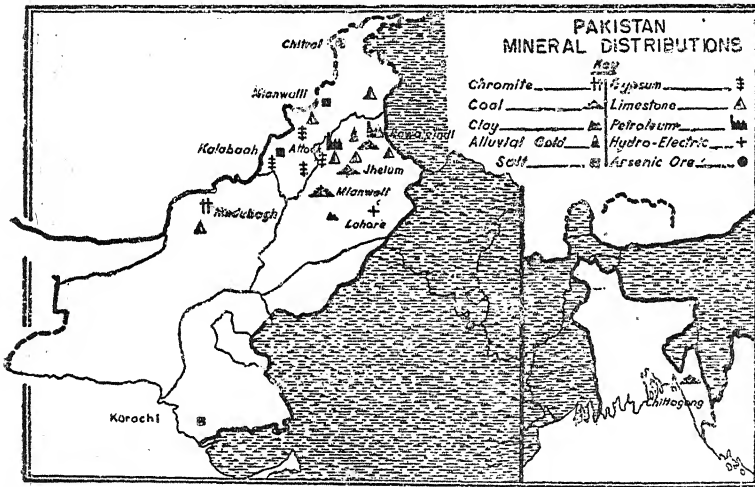


FIG. No. 90. Note the absence of minerals in Eastern Pakistan. Coal and Petroleum deposits may, however, occur in future.

are located in Baluchistan, Chitral and western fringe of the N.W.F.P., but no minerals are mined in areas where the greater number of manufacturing industries are located and denser populations exist. The industrial and commercial exploitation of most of the minerals of Pakistan will depend on the development of cheap and rapid transport.

The important minerals of the Dominion are Chromite, Petroleum, Salt, Saltpetre, Gypsum, Limestone, Clay, Fuller's Earth and Antimony.

Minerals	Annual Production	Areas of Production
Chromite ..	19,000 tons. Most of the Chromite is exported.	Upper Pishin valley and Hindubagh in Baluchistan; N.W.F.P.; Chitral.
Gypsum ..	16,700 tons in 1950.	Jhelum, Shahpur and Mianwali in the West Punjab; Baluchistan; Sind; N.W.F.P. Large deposits of Gypsum have also been found in Dera Ismail Khan.
Fuller's Earth ..	3,000 tons. This clay is non-plastic in nature and is used as filler in soap and paper and in paints.	West Punjab; N.W.F.P.; Sind.
Salt*	West Punjab salt mines produce about 60 lakh maunds of salt, while the Kohat mines yield between 7 to 8 lakh maunds. The production of sea salt in Sind is about 41 lakh maunds.	Sind, the West Punjab and N.W.F.P. The important field for rock salt is in Kohat. Common salt is manufactured at Mauripur (Sind)
Limestone ..	303,000 tons.	Attock, Jhelum and Rawalpindi in the West Punjab; N.W.F.P.
Fire Clay ..	7,000 tons in 1950	West Punjab. Fire clay in Dera Ismail Khan district. Ochre and other coloured clays in Sind and Chitral.
Saltpetre ..	Considerable quantity.	West Punjab.
Antimony ..	Large reserve—but not developed yet Production hardly 500 tons.	Chitral State and Kalat State. The inaccessibility of the neighbourhood, its elevation of 13,500 feet and its climate, which is rigorous enough to limit work to two or three months in the year, have hindered any active exploitation up to the present time at Chitral State.
Alluvial Gold ..	Small quantity.	Jhelum district in the West Punjab. At present gold is obtained by gold-washers from surface gravels only. Attempts are being made to work deeper gravels for gold.
Arsenic ore ..	Reserve unknown.	Chitral in N.W.F.P.
Granite ..	2,00,000 tons (total undivided India 16 lakhs).	The West Punjab and N.W.F.P.

* Rock salt deposits are worked in the well-known Salt Range, covering parts of the districts of Jhelum, Shahpur and Mianwali. Near the village of Khewra, the main seam has an aggregate thickness of 550 ft., of which five seams with a total thickness of 275 feet consist of salt pure enough to

Power Resources of Pakistan

One of the foremost needs of a modern nation is sources of mechanical energy, either coal, oil or water-power. The total installed capacity of the power houses in Pakistan is today 69,074 Kw., of which steam accounts for 32,868 Kw. and hydel 10,700 Kw., diesel and gas give 25,450 Kw. and 56 Kw. respectively.

Both in quality and quantity Pakistan is today extremely poor in coal. The average annual production of coal is only 400,000 tons of tertiary type, not suited to cooking by present methods. The principal coalfields are in Shahpur, Jhelum and Mianwali districts of West Punjab.

PRODUCTION OF COAL IN 1950

Baluchistan . .	234,641	N.W.F.P.	7,213
Punjab	191,908		
Sind	2,988	Total	436,750

The West Punjab coal, however, is "high in volatile matter, often very low in ash and remarkably rich in organic and pyritic sulphur".* It is estimated that Baluchistan, N. W. F. P. and West Punjab contain 300,000 million tons of coal reserves.

In the N. W. F. P., there are three possible coal areas: (a) The Dore river of the Hazara district, (b) Kohat district just north of the Baroch gorge, and (c) Mira Kwand in the Spli Toi in South Waziristan.† In Baluchistan, the Khost area may become in future an important coal field. Already the Government has taken up the task of developing the Sharigh mines in Baluchistan.

In East Pakistan, on the other hand, coal, from all present indications, is most entirely lacking. Because of this, Eastern Pakistan has had to depend on imports for her needs. This coal comes from West Bengal. The latest information is that the eastern part of Chittagong contains coal deposits. But it is doubtful whether the area can become potential immediately.

be placed on the table. The associated beds are impregnated with earth, and in places there occur thin layers of potash and magnesium salts. Open quarries for salt are developed a short distance to the east-north-east of Kalabag on the Indus, and similar open work is practised near Kohat in the N.W.F.P. where quantity of salt may be regarded as practically inexhaustible.

* India's mineral resources, "*Statesman Supplement*", 1940.

† Records of the Geological Survey of India: *Mineral Resources of the North West Frontier Province* by A. L. C. Coulson (1940).

There is a proposal to establish a Fuel Research Station in order to make the best use of Pakistan coal.

Pakistan's total annual coal requirements under the present circumstances are for about 1.5 million tons. The country imports coal in increasing quantities from South Africa, China, Britain, France and Poland. South Africa alone can meet Pakistan's coal requirements for industrial and domestic purposes although this coal is slightly inferior to Indian coal and unsuitable for locomotives. As South Africa has her own mercantile marine, this coal can be cheaper than Indian coal so far as Pakistan is concerned.

Among all the mineral resources of Pakistan, *petroleum* is the most important. Although geological formations give evidence of oil in several regions of Western Pakistan, only one is as yet a significant producer. This region is composed of two fields—Khaur and Dhulian at Attock in West Punjab. In 1929, the *Khaur field* had its maximum production of oil—480,222 barrels. Since then its output has declined rapidly. All the same, the field will remain an important producer for many more years. The *Dhulian field* reached its maximum in 1941 and its output too declined after that.

These two fields were developed by the Attock Oil Company in 1915 and 1937 respectively. The fields are located about 20 miles south of the outer foot of the hills of the Himalayas. Production in these two areas has been around 20 to 36 million gallons a year in recent years. The refinery is at Rawalpindi at a distance of 56 and 67 miles from Khaur and Dhulian respectively. Oil from these fields is brought in a pipe line to the refinery at Rawalpindi. Joya Mair, a new oilfield, about 40 miles south of Rawalpindi has also started production. This field holds out promise of greatly increased oil output in the West Punjab.

Total production of crude oil in Pakistan in 1950 was 1,118,440 barrels of 40 gallons each. The shares were the Khaw field 14,906 barrels, Dhulian 851,558, Joya Mair 149,795 and Balkassar 529,045. At present Pakistan can meet 15 per cent. of her requirements from her own fields. The West Punjab petroleum industry engages about 3,500 workers. Development work is being carried out by the Burma Oil Company at Lakhra, Sind, where the drilling has now exceeded a depth of 9,000 feet.

There are many possible areas of oil production in the N.W.F.P., Sind, Baluchistan and West Punjab. The Kohat Salt region, North Waziristan, Dera Ismail Khan and Bannu districts may yield in future considerable oil. But, at the same time, it is to be noted that "in many parts of the Punjab, however, and in the Baluchistan area the rock-fields have been too deeply truncated by agents of denudation or have been dislocated by earth movements and much of the original stores of oil have disappeared; oil seepages are common enough, but most of them appear to be mere shows not connected with reservoirs that can be tapped by artificial means." In Eastern Pakistan, oil indications are present in the districts of Sylhet and Chittagong. Prospecting work is likely to be started soon.

There is considerable scope for the development of hydro-electric power in Pakistan. Pakistan's hydro-electric potential is to the extent of 6 million Kw. The present installed capacity is only for 10,700 Kw. Already four hydro-electric projects have been planned. These are (a) the Karnafuli Project in East Bengal, (b) the Rasul hydro-electric Scheme in West Punjab, (c) the expansion of the Malakand Station in the N.W.F.P. and (d) Warsak Dam in N.W.F.P. The N.W.F.P. is fortunate in having four rivers—each of which is capable of being harnessed for power and irrigation. The rivers are the Kabul, the Swat, the Kurram and the Indus. The *Rasul Hydro-electric scheme* is by far the most important project in West Punjab. The construction has already started. The project will utilize the head available from the Upper Jhelum canal into the Lower Jhelum canal. The project

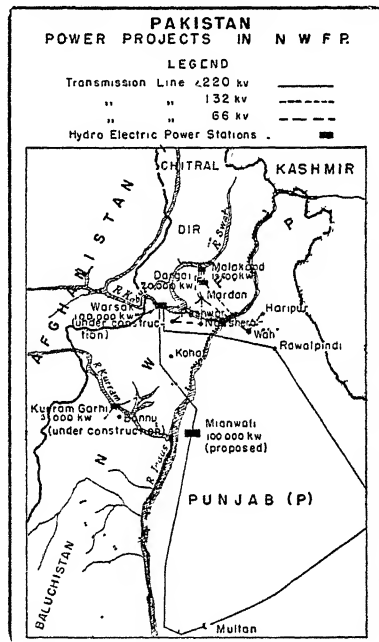


FIG. No. 91.

will develop 14,000 kw. of firm electric power and about 20,000 kw. of secondary power for several towns in West Punjab as well as for lift irrigation.

The Karnafuli Project of East Bengal contemplates harnessing the waters of the river Karnafuli for the development of power. The industrialisation in Eastern Pakistan is handicapped by lack of power. The project will develop 60,000 kw. of energy. Chittagong, Chandpur and Comilla will be served from this source of power. In addition, the project will provide navigation facilities up to the mouth of the Karnafuli, irrigation facilities to an area of 70,000 acres and control of floods.

The Warsak Scheme is being developed on the Kabul river, about 29 miles from Peshawar. The Warsak dam, when completed, will raise the water-level of the Kabul River by about 150 ft. This will provide water for irrigation of nearly 60,000 acres on the right bank of the river belonging to Mullagoria and Afridi tribesmen and 5,000 acres on the left bank belonging to Mohmand tribes.

The Warsak project will help 1,000 tribesmen settle on new land, brought under irrigation, and supply them with power for local industries. The Kabul River Canal will also enable large areas of afforestation to be carried out on the lower slopes of the Peshawar hills. These forests will ease the problem of fuel shortage in Peshawar, while employment in forests will absorb a further number of tribesmen. All these are subsidiary advantages of the Warsak project. The most important is the power scheme which will generate 100,000 kw. This will be supplied to most parts of the West Punjab and will give an impetus to industrialization of that province to the benefit of the whole of Pakistan.

The idea of utilising the waters of the Swat river flowing through the valley north of Malakand for irrigation and hydro-electricity was conceived as early as 1910. The scheme was implemented for irrigation in 1914 and for water power in 1938. Between 1934 and 1938, transmission lines were extended from Malakand to Mardan, to Peshawar *via* Charsadda, to Wah and to Kohat *via* Peshawar. Recently the Government has undertaken a scheme to construct a power channel to take off water below Malakand to Dorgai where there is a fall of 250 ft. The scheme will provide 15,000 kw. of power.

Fruit-production

Both from the standpoint of variety and volume, Pakistan is, indeed, very rich in fruits. Almost all the provinces in the State grow fruits on a commercial scale. The annual production is about 3 million tons. Between 60 and 70 per cent. is consumed in the State and the rest is exported.

The total area under fruit cultivation in Pakistan is about 409,500 acres.

East Bengal	...	...	200,000
West Punjab	...	...	150,000
Sind ..	.	...	50,000
Baluchistan	...	...	8,000
N. W. F. P.	...	...	1,500

East Bengal is noted for mangoes, pine-apples and bananas. Mangoes are raised in abundance in Rajshahi, Bogra, Dinajpur and Rangpur. Bananas come from Dacca, Faridpur, Noakhali and Bakarganj. The East Bengal bananas are the best in the world, and its production is about 43 million maunds a year. Sylhet produces pine-apples and oranges.

The West Punjab has much developed the fruit industry in Rawalpindi, Jhelum and Attock districts. The Muree Hills may be considered as the fruit garden of the province. Oranges, mangoes, lemons and sweet limes are the principal fruits. There is a plan to grow, on commercial lines, apples, walnuts, almonds and olives in the Muree Hills.

North-West Frontier Province grows pears, peaches, figs, plums, bananas and mangoes. Figs, peaches and pears have great demand both in the country and the Indian Union. *Baluchistan* depends for its economy on fruit trade. Grapes, apples, apricots and musk melons are grown extensively for markets in Pakistan and Indian Union. As a matter of fact, Indian Union is the best market for fruits coming from Baluchistan and N. W. F. P.

Sind has a large production of grapes and dates. Dates are also grown in Bahawalpur. Pakistan is the second largest producer of dates in the world being surpassed by Iraq. The annual production is about 4 million maunds.

In spite of large production of fruits in Pakistan, the *fruit canning industry* is yet to be developed on modern lines.

There are however certain difficulties in the way of developing fruit canning industry in Pakistan. Peaches and other fruits are often affected by fruit-fly (*Dacus ferrugineous*). Uneven ripening of peaches is another problem as it affects the uniformity of the canned product. Other difficulties like poor quality of bottles of local production, inadequate supplies of tin, high cost of sugar and lack of stable market are yet to be remedied. The only one fruit canning factory is at Peshawar. Fruit canning in Eastern Pakistan is confined to pure apple canning. Pakistan, however, promises to be a very important source of fruits in near future for the world markets.

Live-stock Production

The relief and climate of Pakistan are generally suitable for livestock population.

	<i>In millions</i>		<i>In millions</i>
Cattle	20 3	Goats	8 0
Buffaloes	5 4	Horses & Mules	2·0
Sheep	5 5	Camels	4

The climate of Baluchistan and Sind does not produce good pasture, so that in those provinces cattle are not so important as in the West Punjab. Although the number of cattle is large in Eastern Pakistan, the quality is inferior to that of the Western Punjab in regard to milk and meat production. The grass has deficiency in Phosphorus and this makes cattle open to disease.

In Eastern Pakistan, heavy rainfall does not encourage rearing of sheep and buffaloes. Nor can camels stand the climate. Cattle and goats, however, are mostly found in this area. In Western Pakistan, camels are mostly found in Sind and Baluchistan. North West Frontier Province, Baluchistan and Sind support a large number of sheep. Buffaloes are mostly found in the West Punjab.

The principal products are milk, hides, skin and wool. *Dairy industry* has developed in the southern side of West Punjab—particularly in the districts of Montgomery, Lyallpur and Multan. *Leather industry* is of growing importance. The annual average production is as follows: cow hides (4·5 million pieces), buffalo hides (·8 million pieces), goatskin (5·3 million pieces) and sheep

skin (20 million pieces). Although raw materials are plentiful, tanning industry has not yet developed in Pakistan. *The annual production of raw wool in Pakistan is about 28 million lbs.* The best wool comes from Sind and Baluchistan. Almost the entire production is exported. The chief buyers of raw wool are the U. K. and the U. S. A. Pakistan is not likely to develop export trade in meat although her leather export is important.

Fisheries

The Pakistan fishing industry, while nationally not as important as agriculture and livestock industries from the standpoint of value of products and numbers of men employed, is, nevertheless, of vital importance to the economy of the Dacca and Faridpur districts in East Bengal as well as of the Sind coast.

Fresh fisheries in Eastern Bengal perform an important function by adding to the food supply. In East Bengal, any diminution of activity in the fishing industry results profoundly in worsening the food position. East Pakistan accounts for more than 80 per cent. of the freshwater fish of Pakistan. Its annual output of fish is about 120,000 tons. The annual output is far beyond the consuming capacity of the province and, therefore, can be exported to the Indian Union. Boats are extensively used for carrying fish to rail or steamer heads at Narayangunj, Chandpur and Goalundo. The important catches are rohu, hilsa, catla and prawns. Fish like kai, magur, singi and sal are abundant in ponds and *bils* of East Bengal. The East Bengal Government are taking a keen interest in the development of fisheries on modern scientific lines. Their rural pisciculture scheme has already recovered about 350 tanks and about 700 bighas of water in 1949-50. Besides this, the Government are undertaking a 10-year scheme for the reclamation of derelict tanks and water areas for the purpose of using them for fish production.

In Western Pakistan, the entire sea-coast along Sind and Baluchistan is important for fishing industry. About 39,000 people are engaged in it. Sind has a coastline of about 200 miles, studded with creeks. The Indus brings silt and other materials in the delta which provide food for fish. For about 80 miles from the coast, the depth of the sea is nowhere more than 100 fathoms. Thus the Sind coast has become an important fishing ground.

The Baluchistan coast is about 350 miles. There are bays and backwaters—but no discharge from rivers. The fishing is carried within 10 miles of the coast. About 93,000 maunds of sea-fish are caught annually off the Baluchistan coast. The Mekran coast is famous for the quality and quantity of fish.

Both in Baluchistan and Sind coasts, the fishing is practised from September to May. During the monsoon months, the sea is rough and the fishermen practically remain idle

TOTAL CATCHES PER YEAR IN SIND

Sea-fish			198
Fresh-fish	..	...	266 5
			<hr/>
			464 5

The catches are prawn, salmon, mullet, pomfret, mackerel and hilsa. Sind is a great exporter of fish. The Sind Government is carrying out systematic work in preparing and analysing the oils obtained from the liver and body of fishes, such as skates, rays and other varieties which were hitherto not utilized. As a result of the utilization of these fishes, it will be possible to manufacture glue and gelatine. A little quantity of fresh fish is also caught in N.-W.F.P.

The total quantity of cured fish and prawn exported from Pakistan during 1951 was 5,000 tons.

Manufactures

"The most striking feature of Pakistan's present economy is the marked contrast between its vast natural resources and its extreme industrial backwardness."* This backward position has been the result of certain forces: first, in the early years of the last century, organised industries were located in Calcutta, Bombay and Ahmedabad; secondly, during the World War I, the movement in the development of manufactures started in the central regions like Indore, Kanpur, Nagpur, Tatanagar and

* The Dominion produces more than 80 p.c. of the world's raw jute, 1·5 million bales of good quality cotton, abundant quantities of wool, hides and skin, sugarcane, tobacco, fruit and fish. The resources in minerals are also considerable.

Jubbulpur; and thirdly, technical institutions, research laboratories, credit and service agencies have developed mostly in Calcutta, Delhi, Madras, Bombay, Kanpur, etc. Thus, the regions now constituting Pakistan are not industrialised when judged by the number of establishments and persons employed therein.

LARGE INDUSTRIAL ESTABLISHMENTS IN 1946-47

		East Bengal	N.W.F.P.	West Punjab	Sind	Total
Cotton mills	...	9	—	4	1	14
Sugar Factories	..	6	1	4	—	11
Cement ..	...	1	—	1	2	4
Soap ...	...	1	—	1	2	4
Glass ..	...	2	—	3	—	5
Chemicals	..	—	—	2	1	3
Matches	...	4	—	2	—	6
Woollens	..	1	—	1	—	2
Silk	.	—	—	—	2	2
		—	—	—	—	—
		24	1	18	8	51
		—	—	—	—	—

About 200,000 persons are employed in the main industries of Pakistan.

The future of Pakistan, however, in matters of industrial development is hopeful. A number of minerals like coal, iron and oil may be discovered on a proper geological survey although it will take time. The present shortage of capital goods and capital for the expansion of various industries for which raw materials are available, will not remain a problem for ever. She can depend upon external sources for capital to finance equipment for the development. Unless accurate and exhaustive statistics about Pakistan are made available foreign capital will be slow to enter Pakistan.*

Cotton mills : At present Pakistan has 18 cotton mills with 53,300 looms and 350,000 spindles. The industry gives employment to about 19,000 persons. The annual production of mill cloth had increased to 85,112 bales in 1952 against 58,000 in 1950. About 235 million yards are produced by hand looms. East

* She must, if she is to attract the foreign capital she needs, make clear to potential investors that they are welcome, that no further nationalisation is intended, and that the remission of profit will not be hampered. (See Lord Burghley's Report on U. K. Industrial Mission to Pakistan.)

Bengal leads in the cotton textile industry with 10 cotton mills having 95,208 spindles and 2,522 looms. The mill centres in East Bengal are Khulna, Bagerhat, Narayanganj and Kushtia. Six mills are in Narayanganj with 1,787 looms and 41,852 spindles.

In West Punjab, the cotton mill centres are Lyallpur, Lahore and Okara. Karachi is the only centre for cotton mills in Sind.

In 1950, the cotton mills of Pakistan consumed 100,000 bales of raw cotton of 400 lbs. each. The Dominion is not self-sufficient in cloth, the shortage being for about 500,000 tons (500 million yds.).

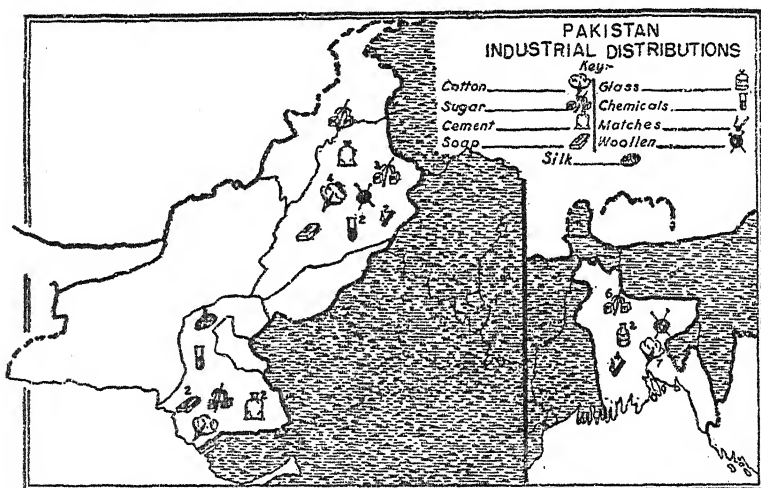


FIG. No. 92. The number against each industry refers to 1947-48.

The future of cotton industry is full of promise, as Pakistan is a great producer of raw cotton and consumer of cloth. The Government may undertake the construction of textile factories, if private capital is not forthcoming.

Pakistan imports cotton textiles mostly from the United Kingdom, though low-grade Japanese textiles are also in great demand for their low prices.

Sugar Industry : In the production of sugar, Pakistan has made a little progress. The annual production in 1951 was 43,000 tons as against the requirements for more than 200,000 tons.

The sugar factories in Pakistan are located as follows:—

Regions.		No.	Locations.
East Bengal	...	6	Dacca, Rajshahi, Mymensingh, Dinajpur, Jessore.
West Punjab	...	4	Rawalpindi.
N. W. F. P.	..	1	Abbotabad.

11

East Bengal can increase her production of sugar-cane in Mymensingh, Chittagong, Dinajpur and Rangpur where the soil and climate are favourable for this crop. A sugar factory, the biggest of its kind in Asia has been constructed at *Mardan* in N.W.F.P. It will have a capacity to produce 50,000 tons of finished sugar per year. This would be a great step towards making Pakistan self-sufficient in sugar. Power alcohol from sugarcane is manufactured at Darasa in East Bengal.

The Woollen Industry : Tweeds, rugs, carpets and blankets are being manufactured in Sind and Western Punjab. The woollen industry in Sind is mostly confined to the desert areas. A factory has been established recently at Karachi for the manufacture of yarn and worsted yarn. Pakistan's blanket industry consumes about half the raw wool production of the country. The Pakistan Government have started two woollen mills with 2,000-spindle capacity each. The mills are located at Hannai in Baluchistan and Bannu in N.W.F.P. and are in operation from 1952

There are six *match factories* located at Lahore and Dacca. Of the three factories in Lahore, two are owned by the Western India Match Company. The Lahore factories employ about 500 workers recruited locally from Lahore and its surrounding villages. The *cement industry* is well organized. At present there are five cement factories—four in West Pakistan and one in East Bengal. The centres are Wah (in the Attock district), Karachi and Sylhet. The factory at Wah belongs to the Associated Cement Companies and employs about 1,500 workers recruited mostly from the adjoining villages. The Associated Companies also own the cement factory at Rohri in the Sukkur district of Sind. The annual production of cement is about 600,000 tons, of which 50 per cent. is required for domestic consumption. The *glass*

industry is of recent growth. There are five factories—two in East Bengal and three in the West Punjab. Dacca is the chief centre of glass manufacture in East Bengal.

Pakistan Government is taking steps to develop various manufacturing industries. Three *jute mills* of 100 looms each are likely to be started soon in East Bengal at Narayanganj, Chittagong and Khulna. Although Pakistan has no *paper mills* at present, the supplies of chemicals and other raw materials are considerable for the development of paper industry. Resin, salt and lime of West Punjab and the large quantities of bamboo in East Bengal can help the location of paper industry. A paper mill at Kaptaimuk, halfway between Chittagong and Rangamati is to be started soon, as the surrounding region is very rich in bamboo resources. Straw-board and chief wrapping paper can be manufactured in Karachi.

Communications

Pakistan has expanding means of transportation by land, air and water. Since the country is an agricultural one and has large surplus of products for export, the transport systems will always play a vital part in Pakistan's economy.

Railways : In Pakistan there are 6,994 miles of railway lines. Before the partition, the Pakistan-railway-system was part of the B. A. Rly. and the N. W. Rly. The railway system of Pakistan was originally designed primarily for strategic purposes and also for the transport of agricultural produce from the irrigated areas of N.W.F.P., Punjab and Sind to Bombay, Delhi and Karachi. The railways in East Bengal also had as the objective the supply of raw materials, *e.g.*, jute to Calcutta. The railway system is now to be rearranged within the confines of the country's geographical boundaries to meet the changed conditions. Not only there is lack of coal in the country, rolling stock is also in short supply.*

* The main difficulties of the Pakistan railways are:—

- (a) Shortage of trained technical staff;
- (b) Lack of suitable workshops and repair facilities in East Pakistan;
- (c) Uncertainty in respect of coal;
- (d) Shortage of locomotives, wagons and carriages.

The Government is making *Sodepur* workshop fully equipped. Another workshop is being set up at *Pahartali*.

The N. W. Ry. has its headquarters at Lahore. It has about 5,363 miles of line. There are two main lines with several branches.

- (a) Lahore to Peshawar *via* Wazirabad, Rawalpindi and Attock. From Wazirabad a line goes to Sialkot on the border of Kashmir.

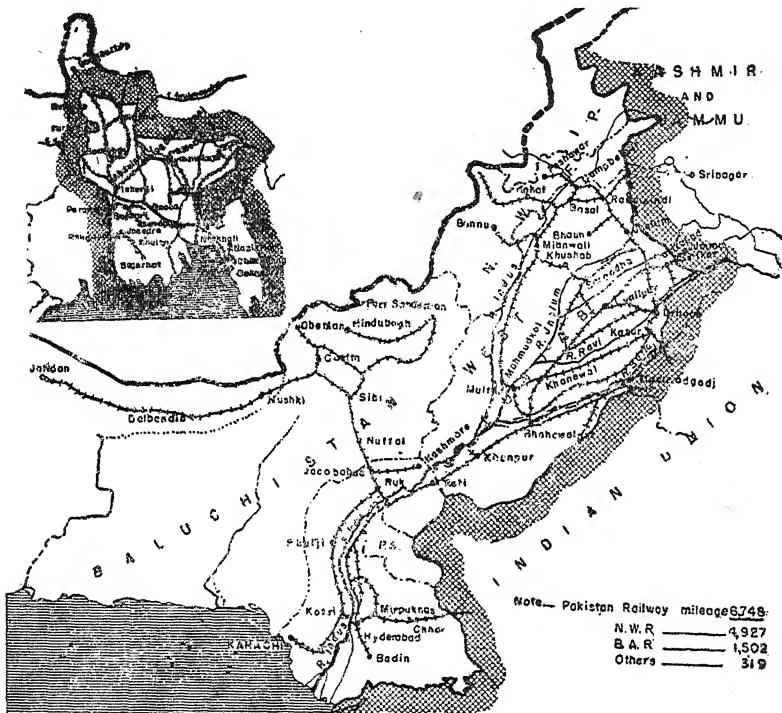


FIG. No. 93. The railway lines in Western Pakistan were constructed not so much to serve the natural industrial and commercial needs of the country as for strategic requirements.

- (b) Lahore to Karachi *via* Khanewal, Lodhran, Rohri and Sukkur. The line crosses the Indus at Rohri. From Sukkur a branch line goes to Zahidan *via* Sibi and to Chaman *via* Quetta.

The position in respect of coal is causing anxieties. "A programme of conversion of locomotives to oil burning is in hand. 172 locomotives have already been converted and the intention is to convert at least 50 per cent of the existing fleet of locomotives on N. W. Ry. as soon as availability of raw materials permits" (vide Government of Pakistan—Transport and Industry by the Ministry of Industries).

There are also other branch lines which connect Wazirabad with Khanewal, Peshawar with Muzaffargarh; Rohi with Badin.

In East Pakistan, there are two distinct systems of railways—broad gauge and metre gauge. The Brahmaputra divides the country into two parts. On the right bank of the river the railways consist of broad gauge track, which is mostly single-line, and a relatively small mileage of single-line metre gauge. On the left bank of the river the country is served by a metre gauge single-line track with Chittagong as the terminus. There is no direct connection between the two systems except by river transport. The main railway lines of the E. B. Ry. run from Chittagong in metre gauge (a) Sylhet *via* Laksam, Comilla, Narayanpur and Kulaura. From Laksam, there is a branch line to Chandpur; (b) to Bahadurabad *via* Narayangunj and Mymensingh. Mymensingh is connected by a line with Dacca. There is now much congestion of traffic in the line between Chittagong and Bhairab Bazar, now that most of the trade of East Pakistan passes through Chittagong. There is a proposal to double the line along this system to cope with the increased and increasing traffic. Poradah is an important railway junction of the broad gauge lines. From here lines go to (a) Serajgunj on the Jumna in Pabna; (b) Rajbari on the Padma and thence to Faridpur; (c) Domar *via* Iswardi and thence to Darjeeling. "With the development of Chittagong and consequent change in the pattern of traffic, the maintenance of broad gauge in this area is expected to become uneconomic. In order to introduce rationalisation, reduce the cost of maintenance and avoid the break of gauge at various points in the country, the Railway Department has been examining the possibility of converting this line to metre gauge."* The railway mileage in Eastern Pakistan is 1,502

* Transport and Industry by Government of Pakistan published by Ministry of Industries.

The main difficulties of E. B. Ry.—are the uncertainty in the supply of coal, shortage of locomotives and wagons and lack of suitable workshop and repair facilities. The E. B. Ry. depends on the supply of coal from India, a factor which is a matter of concern to Pakistan in view of the not too friendly relations with India. Nor is it economical to import coal from distant places like South Africa and Australia. Then, again, locomotives and wagons are too difficult to obtain in number as required by Pakistan from U.K. and U.S.A. because of the demand from several countries for such materials. For workshop and repair facilities, Pakistan Government has undertaken to develop two centres—at Sodepur and Pahartali.

Road transport in the modern sense of the term is highly developed in the West Punjab and N.W.F.P., where there are about 7,000 miles of metalled road consisting of main and trunks. In East Bengal, however, heavy rainfall and existence of numerous rivers make road construction difficult and expensive. There are no trunk roads in East Bengal. The total mileage of roads in Pakistan is about 60,000. There are three types of roads in Pakistan—superior, surface roads, metalled roads and unmetalled roads. The superior roads are cement concrete or tar macadam. Metalled roads are kankar consolidated or brick pavements. The unmetalled roads are katcha earth roads.

	Superior Roads	Surface Roads	Metalled Roads	Unmetalled Roads	Total
Punjab	2,694		410	12,883	15,987
N.W.F.P.	1,103		120	1,899	3,122
Sind	597		160	11,648	12,405
Baluchistan	586		637	3,453	4,676
E. Pakistan	594		1,028	20,172	21,794
Total	5,574		2,355	50,055	57,984

Frontier roads :

There are five main land-routes which connect Pakistan with Iran, Afghanistan and Sinkiang.

(a) From Chaman (in Baluchistan) along the Khojak Pass to Kandahar and Herat.

(b) From Quetta to Zahidan on the Iran-Baluchistan border by a branch line of the N. W. Railway, thence by caravan to Iran. Of late,

regular motorable roads have been opened connecting Zahidan with Teheran *via* Bam, Kerman, Yezd, Ardistan and Kasan.

(c) From Peshawar along the Khyber Pass (3,370 ft.) to Kabul and Jalalabad. The distance between Peshawar and Kabul is

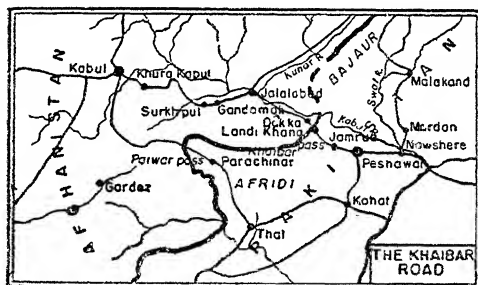


FIG. No. 94.

about 170 miles. The Khyber Pass is only 30 miles long.* This is the only easy outlet to Afghanistan from the Western Pakistan. This is the route through which Alexander the Great, Timurlane, Chenghis Khan, Nadir Shah and others invaded India. The route has followed Kabul river. From Peshawar to Landikhana—a distance of 55 miles—the road lies far to the south of the river.

(d) From Attock, in the West Punjab, to Kashgar (Sinkiang) *via* Gilgit. It takes 12 days hard tracking to reach Gilgit. There is also a 350 mile caravan route from Peshawar to Gilgit in the high Karakoram over Babusar Pass (13,700 feet). From Gilgit a branch route goes South-east 100 miles up the Indus to Skardu, the Capital of Baltistan. Gilgit is a centre of an age-old caravan traffic from Sinkiang. From Kashgar the traders bring silk, cotton cloth, carpet, sheepskin and goats to exchange from kerosene, sugar, matches and salt. Peshawar-Gilgit route has been widened recently by the Pakistan Government so that motor lorries can traverse the whole distance within four days.

(e) From Dera Ismail Khan along the Gomal Pass (7,500 ft.) to Kalat and Kandahar. The Gomal Pass as a trade route is the oldest of all trade routes in the Indo-Pakistan sub-continent. From the plains of Afghanistan, every year thousands of traders with the caravans enter the sub-continent down the Gomal. The traders bring camel loads of silk and fruit, bales of camel and goat hair, sheepskins and carpets from Kabul and Bokhara.

Waterways. The rivers of Western Pakistan are little used for transport. Though the Indus is one of the greatest waterways of the world, it has ceased to carry traffic since the railway traversed its valley.

The Indus rises on the north side of the Kailash range, near the source of the Sulej. The Indus flows first north-west through Ladak between the Kailash and the main Himalayan range up to Gilgit, from where it takes a sharp bend towards the south and maintains this direction for the rest of its course. Near its

*** Alternative to Khyber Pass Trade Route.**

The possibility of the development of an alternative trade route to the existing highly expensive motor lorry road over the Khyber Pass is envisaged in the construction of Pakistan's Warsak hydro-electric station.

The dam will result in penning up the water of the Kabul River and make this stretch of the river navigable. This part of the river could also be used as a water reservoir for fisheries and industries being developed in the N. W. F. P.

mouth the Indus divides into distributaries "which form intricate channels across its reed-covered delta, fringed with mangrove swamps". In its upper and middle course, the Indus receives the waters of the *Shayok*, *Kabul*, *Kuram* and *Gomal*. But the most important tributaries are the *Jhelum*, *Ravi*, *Chenub* and *Sutlej*—all flowing from the western Himalayas and joining the Indus at Mithunkot. These four great tributaries, with the Indus itself, give their name to the Punjab—that is, the "Five Waters".

The Indus is 1,800 miles long and is navigable for 1,000 miles from its mouth. The shifting character of its banks and sudden floods during the rainy season are responsible for the absence of important towns on its course. It is interesting to note that Multan, Lahore, Lyallpur, Wazirabad and Bahawalpur are situated not on the main stream but on its tributaries.

In Eastern Pakistan, the river navigation with 4,500 miles of route occupies a very important place. There is no other region in the world which has so many navigable rivers, distributaries, channels and creeks as in East Bengal.

The chief rivers of East Bengal are the Padma, the Brahmaputra and the Meghna. *The Padma* is really the continuation of the Ganges.* It flows towards the south-east from the Murshidabad-Maldah districts through Rajshahi, Pabna, Faridpur and Dacca. *The Brahmaputra* from Assam enters East Bengal in Rangpur and flows towards the south and joins the Padma near Faridpur. *The Meghna*, known as the Surma in Sylhet, meets the Padma near Chandpur.

Regular steamer services are maintained between (a) Chandpur and Narayangunj; (b) Goalundo and Chandpur; (c) Goalundo and Narayangunj; (d) Dacca and Barisal; (e) Barisal and Lohajang. These services are essential not only for passengers but also for the movement of jute and rice of Pakistan.

Aviation. It maintains swift communication between the two parts of the country awkwardly divided by the great land mass of the Indian Union.

Pakistan is to-day supplied with airports and aerodromes in many parts of the country and is in a position to meet the expansion of aviation that has resulted from post-war developments.

* The Ganges divides itself into two parts near Maldah, one part flowing towards the south as the Bhagirathi and the other towards the south-east as the Padma.

The important aerodromes are at Karachi, Lahore, Quetta, Peshawar, Hyderabad (Sind), Multan, Dacca, Chittagong and Sylhet. Two companies—Orient Airways and Pak Air Services—maintain services in Pakistan. They also operate services to Bombay, Calcutta and Delhi in the Indian Union as well as to Ceylon, Burma, Singapore, Teheran and Cairo.

THE PRINCIPAL AIR ROUTES (1948-49)

1. *Orient Airways*

Karachi—Quetta—Lahore	2 weekly
Karachi—Lahore—Rawalpindi—Peshawar	3 „
Karachi—Calcutta—Dacca—Chittagong	3 „
Karachi—Ahmedabad—Bombay	3 „
Karachi—Quetta—Zahidan—Meshed—Teheran	1 „
Calcutta—Dacca	daily
Dacca—Chittagong—Sylhet	„
Calcutta—Chittagong	.. „
Chittagong—Akyab—Rangoon	„

2. *Pak Air Services*

Karachi—Lahore	daily
Karachi—Delhi	„
Lahore—Delhi	„
Lahore—Rawalpindi—Peshawar	3 weekly
Karachi—Bombay—Colombo	3 „
Karachi—Calcutta—Rangoon—Singapore	3 „
Karachi—Cairo	2 „

Karachi is the principal airport. Its position on the international trunk routes has made it very important.

KARACHI AIR PORT TRAFFIC

(Monthly average based on January to May 1948)

Aircrafts arrival and departure . .	979
Passengers embarking and disembarking	8228
Passengers in transit ..	3524
Mails on-loaded and off-loaded ..	107,722 lbs.
Mails in transit	221,797 lbs.
Freight on-loaded and off-loaded ..	339,423 lbs.
Freight in transit	158,314 lbs.

The Pakistan air-line service with the Indian Union is being operated under agreement with the India Government.

Pakistan's air-lines, however, are not yet profitable commercially. Load factors and utilization of planes are below economic levels. In Eastern Pakistan, lack of technical personnel and radio equipment have prevented services to Faridpur, Comilla and other places having war-time aerodromes.

Ports and Trade Centres

Pakistan has access to the Arabian Sea and the Bay of Bengal. The two important ports are Karachi and Chittagong.

Karachi. Karachi is the most important port of Pakistan. It is provided with a splendid natural harbour. Its hinterland is very extensive covering as it does Persia, Afghanistan, Baluchistan and the West Punjab.

The American Civil War, the opening of the Suez Canal in 1867 and the establishment of direct railway link with the Punjab in 1878 led to the development of Karachi as a great wheat and cotton export centre. For long, its expansion was held

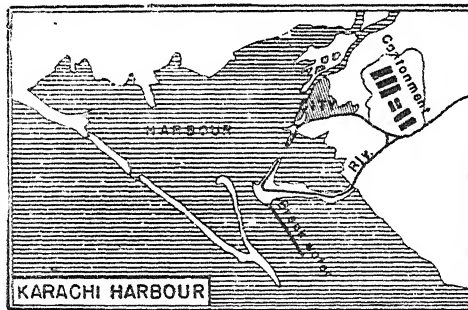
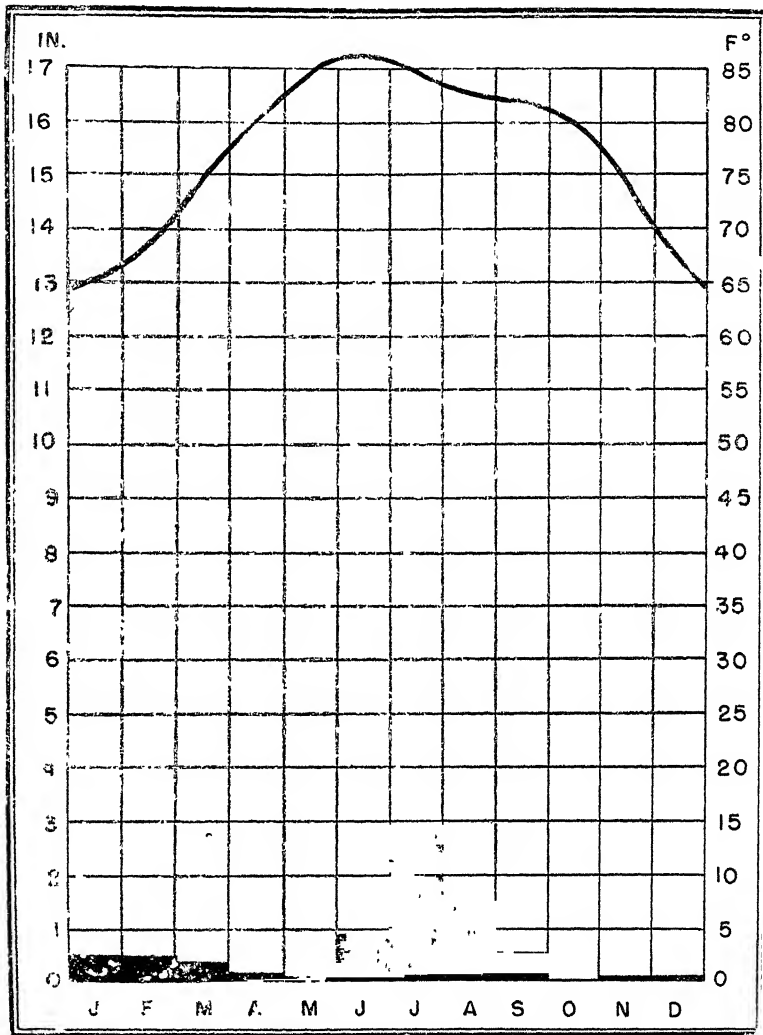


FIG. No. 95.

up because of the greater shipping facilities in Bombay and also because of the backward industrial condition of its hinterland. The principal exports are wheat, oil seeds, cotton, wool, hides and bones. The imports are cotton manufactures, sugar, metals, machinery, oil, woollen manufactures, liquor, chemicals, etc. Karachi is more noted for commerce than for industries. With the exception of wheat, other industries are little developed. Karachi is connected with its hinterland by the North Western Railway.

A striking increase in the volume of tonnage handled by the port of Karachi has been recorded during the past three years.



KARACHI

FIG. No. 96.

ever since the birth of Pakistan. Though exports have declined during the period, imports have, nevertheless, risen and the gross

turnover of tonnage has progressively increased as is borne out by the following table:

Year	Imports	Exports	Total
1947-48	11,56,353	10,27,521	21,83,874
1948-49	16,02,747	9,39,934	25,42,681
1949-50	19,08,422	9,23,476	28,31,896
1950-51	23,91,000	10,82,000	34,73,000

The figures for the past year almost equal the record of 28,63,567 tons attained during the war in 1944-45.

To increase the capacity of the port still further by 34 per cent. to 50 per cent., the Karachi Port Trust has a scheme under consideration to undertake an improved lay-out of the 17 berths of the East Wharves which are constructed of wooden decking and need rebuilding.

The Karachi Port Authorities have also helped industry by the lease of plots of land served by rail and road to various industrial concerns.

Government are considering the construction of a fishermen's harbour with a boat-slip and yard, served by road and rail, and space for boats, drying of nets, refrigeration, canning and other developments.

Chittagong is an important outlet for the produce of East Bengal. It is situated at a distance of 11 miles from the mouth of the Karnafuli river. It has been a trading centre since the 16th century. With the opening of the Assam-Bengal in 1895, it

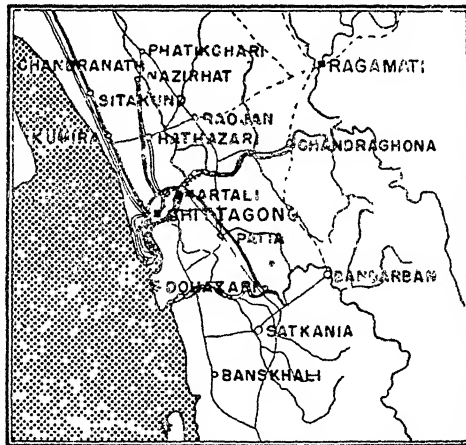


FIG No 97.

has become an important port. The chief article of export is tea. In fact, the popularity of the port is due to the fact that it handles tea in a manner which ensures the arrival of

tea in London in good condition. The other exports are jute, kerosene, rice and raw cotton. The imports are chemicals, machinery, metal, salt, cotton goods and sundry instruments. The port facilities are limited and already strained to the utmost. There is now a serious warehousing problem.

During the last three years there has been a steady increase in handling capacity of Chittagong. At the time of partition the port could handle only 600,000 tons of goods a year. Capacity has now been raised to 1,800,000 tons by an expenditure of Rs. 10 million on the most urgent needs.

Recently a Committee has been set up by the Government to consider schemes for the development of the port in respect of harbour equipment and accommodation which will further increase its capacity to 4,000,000 tons. The development of Chittagong port has been given very high priority in the Pakistan Government's six-year plan, which is one of the projects associated with the Colombo Plan.

CHITTAGONG: TONNAGE HANDLED BY THE PORT (Tons)

Year	Import	Export	Total
1947-48	263,721	157,124	420,845
1948-49	358,008	239,572	597,580
1949-50	709,900	298,383	1,008,363
1950-51	1,268,606	426,401	1,675,009

Side by side with the development of Chittagong port, the Government of Pakistan has decided to open near *Chalna* (district Khulna) on the river Pusoar, an inland port to handle ocean-going vessels. The location of the new port is about 80 miles from the sea and $1\frac{1}{4}$ mile from Chalna. The port is served by inland water transport. The new port will relieve both the Chittagong port and the Eastern Bengal Railway of pressure of traffic. It will handle outgoing jute and tea and incoming coal and foodgrains. The yearly tonnage that will be handled is estimated at 500,000. The Pakistan Government also made surveys for finding suitable sites for alternative ports on the banks of the Harringhatta and the Meghna. The Harringhatta has a bar at its estuary which makes it unsafe for vessels. The Meghna, on the other hand, is constantly shifting in its course.

The other minor ports are *Cox's Bazar* and *Noakhali* in Eastern Pakistan and *Keti Bandar* in Sind.

The West Punjab has an area of 61,775 square miles with about 13 million population. The density per square mile is 263 persons. Agriculture is the main occupation of the population. The province is rich in rock salt, petroleum and coal of tertiary origin.

There is a large number of towns with population more than 100,000 in each. The important towns of the West Punjab are Lahore, Rawalpindi, Sialkot, Lyallpur and Multan.

Lahore, the capital of West Punjab, is the largest city and the chief trading centre of the province. It stands on the river Ravi and is 33 miles distant from Amritsar. Cotton weaving, tanneries, glassworks, flour mills, sugar mills, etc., are the chief industries. Leather trade is important. According to 1941 census the population is about 700,000.

Lyallpur, 87 miles south-west of Lahore, is the biggest wheat-exporting centre of West Pakistan.

Multan is a frontier town. It is an important collecting centre. It brings fruits, drugs, silk and spices from Afghanistan and passes them on to the East. It is connected by railways with Lahore and Karachi.

Sind has an area of 48,136 square miles with 4.5 million population. About 62 per cent. of the population are engaged in agriculture. Industry occupies about 8 per cent. of the population, while in fishing about 39,000 people are engaged. The principal exports are raw hides and skins and wheat. The trade centres are *Karachi*, *Sukkur*, *Hyderabad*, *Badin*, and *Jacobabad*.

The North West Frontier Province is mountainous and covers an area of 64,000 square miles, of which the Tribal territory accounts for 24,986 square miles. It has a population of 3 million. The chief trade centres are Peshawar, Abbottabad, Dera Ismail Khan and Thal. *Abbottabad*, with a population of 40,000 is a hill station on the border of Kashmir. Leather and stone works are carried on in the city of an extensive scale. Recently certain weaving and spinning mills have been established. *Peshawar*, the capital of the Province, is an important military and trading centre.

Baluchistan is the largest unit in Pakistan, and covers 134,002 square miles. The population is only 857,835 which gives a

density of 9 persons per square mile. The plains are barren and stony. The climate is subject to extreme heat and cold, and the rainfall scanty and uncertain. The region is noted for fruits like grapes, apricots, peaches, apples, pears and melons which are cultivated with the help of irrigation. The principal trade centres are *Quetta*, *Chaman*, *Zahdan* and *Hindubag*. The capital is *Quetta*.

In *East Bengal*, the important towns are *Dacca*, *Narayanganj*, *Mymensingh*, *Faridpur*, *Rangpur*, *Sylhet* and *Chandpur*. The major industries of *East Bengal* are tea with largest number of

establishments, jute presses with largest number of workers employed, followed by cotton spinning and weaving mills. Rice mills, like tea factories, are numerous but engage less number of employees than those in railway and engineering workshops and sugar factories.

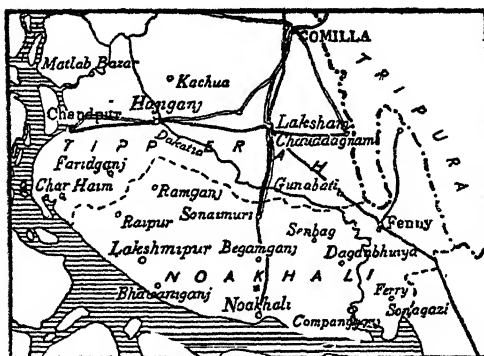


FIG. No 98 Location of Noakhali

In *East Bengal*,

there are 116 tea industries, 84 rice mills, 63 jute presses, 21 general engineering establishments, 14 hosiery and knitting mills, 13 railway workshops, 13 cotton mills, 9 sugar factories, 6 boat-building and repair shops and 6 printing and book-binding establishments.

Dacca is famous for shell bangles and for the works on gold and silver. It is the most important inland trade centre. It is situated in the heart of the jute-growing districts. *Narayanganj* is practically the port of *Dacca*. It is an important centre of trade in Eastern Bengal. It has a population of about 45,000. *Sylhet*, on the *Surma* river, is important for fruits and lime.

Foreign Trade

Pakistan is not self-sufficient in many commodities required by modern industry. Coal, machinery, textiles, automobiles, chemicals, paper, iron and steel goods, sugar and rubber products

are all used in quantity by Pakistan industry or needed to fill the wants of the Pakistan consumers. The maintenance of a large volume of trade is, therefore, of great importance. It is only by importing on a large scale that she can meet her needs for the many goods that cannot be produced in Pakistan.

The principal items of exports are raw cotton, raw jute, raw wool, woollen manufactures, gypsum, potassium nitrate, raw hides and skins. Some foodgrains, tea, fruits and vegetables are also exported. Raw jute constitutes the most important item of export as the entire production is exported. The next item is raw wool. Hides and skins of Pakistan have demand outside and in 1950-51, these articles were third in the list of exports. Cotton is an important article of export. About two-thirds of the cotton production are exported outside including India, Indian Union, United Kingdom, Belgium, U.S.A., Russia, Italy, France, China and Australia are the chief destinations of Pakistan's exports.

THE VALUE OF THE CHIEF ARTICLES EXPORTED

(1951-52)

Articles	Lakhs of rupees	Articles	Lakhs of rupees
Raw Jute	74,12	Tea	5,03
Raw Cotton	72,18	Cotton Seeds	64
Raw Wool	4,55		
Hides and Skins	3,91	Value of Total Exports	170,41

Indian Union imports chiefly raw cotton, raw jute, raw wool, and foodgrains from Pakistan.

The chief items of imports are textile yarn and manufactures, mineral oils, machinery, steel and manufactures thereof, motor cars, chemicals, food, paper, electrical goods, etc. Her imports from India include cotton cloth and yarn, jute manufactures, sugar, gur, iron and steel, paper and coal.

Cotton textiles account for 25 per cent. of Pakistan imports. The sources of imports are Indian Union, U.K., U.S.A., Italy, Iran, China, Ceylon and Straits Settlements.

VALUE OF THE CHIEF ARTICLES IMPORTED (1951-52)

Articles	Lakhs of rupees	Articles	Lakhs of rupees
Cotton twist and yarn	24,48	Oils	10,59
Cotton piece goods	34,57	Rubber manufactures	1,48
Metals and ores	1,39	Woollen goods	2,01
Hardware	1,31		
Vehicles	5,28	Value of Total Imports	1,58,32

Britain furnishes over 30 per cent. of Pakistan's *overseas* imports and takes nearly 25 per cent. of her exports. Cotton textiles are Pakistan's largest single import from Britain. Recently the value of U. K. cotton exports to Pakistan has dropped considerably. This is because the quality is not right for the market. "While the textile famine lasted Pakistan buyers were willing to take British goods in large quantities because no alternative was offered. Now, with low-grade Japanese textile readily available, the type of product that is produced by British textile mills is no longer so easily absorbed."

PRINCIPAL COUNTRIES IN EXPORT TRADE

(in lakhs of rupees)

Indian Union	55,63	France	10,07
U. K.	31,94	Italy	4,39
U. S. A.	16,04	Japan	33,38
China	8,90	Total	2,52,84

PRINCIPAL COUNTRIES IN PAKISTAN'S IMPORT TRADE

(1950-51)

(in lakhs of rupees)

Country	Value	Country	Value
Indian Union	21,83	Holland	2,21
U. K.	33,40	China	8,40
U. S. A.	9,88	Japan	23,46
Italy	6,75	Grand Total	1,42,50

QUESTIONS

1. What are the economic products of Pakistan? Do they compete with the Indian Union products in the foreign markets?
2. State briefly the prospects of the Dominion of Pakistan becoming a self-supporting economic unit
3. Suggest a division of Pakistan into natural regions. Give full reasons for your answer.
4. What are the chief mineral products of Pakistan and where are they obtained?
5. Describe the distribution of population in Pakistan and account as fully as you can for the facts you state
6. Write a short account of the transport systems of Pakistan so as to emphasise their importance in the Dominion.
7. On a sketch map of Western Pakistan show the regions where irrigation has much developed.
8. On an outline map of Eastern Pakistan,
 - (a) shade the principal jute-growing areas;
 - (b) indicate the main waterways with at least three river ports
9. Write short notes on the following.—Lahore, Peshawar, Rawalpindi, Dacca and Narayangunj.
10. Describe the principal exports and imports of Karachi and Dacca
11. What manufacturing industries, in your opinion, can be developed in Eastern Pakistan? (Cal B.Com, 1949).
12. Examine the present position and the future prospects of the following industries in Pakistan: (a) Sugar industry, (b) Cotton mill industry
13. Discuss the nature of trade between Indian Union and Pakistan.
14. To what extent is Pakistan dependent on Indian Union for the supply of consumption goods? Are there alternative sources available now for such goods? (W B C.S., 1949).
15. Describe the distribution of jute, cotton and wheat in Pakistan and relate their distribution to the geographical causes.

BURMA

[Burma was separated from India in 1937. In her racial type and culture, as well as in her geographical position, Burma belongs to the Indo-Chinese Peninsula.]

Burma occupies the north-western and western part of the great southward projection of the Indo-Chinese Peninsula. On the east lie the Chinese provinces of Yunnan, French Indo-China and Siam. To the north is the rugged region where India, China and Tibet meet. Burma presents the form of a kite, some 870 miles from north to south and 575 miles from west to east, *with a long tail extending to another 600 miles southward*. The coast-line is about 1,200 miles long and more broken than that of India.

Burma has an area of 2,60,000 square miles with a population of more than 16 million. The average density of population in Burma is 72 per square mile as compared to 496 in Japan, 250 in China, 247 in India, 140 in Philippines and 103 in Malaya. In fact, Burma's density is lower than that of all other countries of south-east Asia. The highest densities in Burma are confined to the divisions of Pegu, Irrawady and Mandalay with 215, 198 and 153 per square mile (1941). Pegu and Irrawady divisions have 2·9 and 2·7 million population followed by Tenasserim with 2·1, Sagaing 2·3, Magwe 1·9, Mandalay 1·9, Arakan 1·2 and Eastern States 2 million. Absence of large cities and the low proportion of flat and well-watered land are responsible for the low density in Burma.

The Burmans constitute roughly two-thirds of the total population. The Indian population is about 1 million. The Burmans are noted for their generosity, hospitality and enthusiasm. They are known as "*the Irish of the East who have won all hearts*". The people of Burma are mostly Mongolian and are generally better off and better educated than the Indians. They are open and frank, and they easily adapt themselves to those with whom they come in contact. Men and women enjoy equal rights in society. If the Burmans are not hard-working and enterprising it is because life in Burma has not been particularly strenuous. The prevailing



FIG. No. 99. There is no railway communication between Burma and Indian Union or Eastern Pakistan.

religion is Buddhism, which is professed by about 85 per cent. of the population. The indigenous races of Burma are mainly of the Mongolian stock. There are three main divisions: (i) The Tibeto-Burman, (ii) the Mon-Khmer and (iii) the Tei-Chinese. They are more or less distantly related and connected; although bitter at times, the assimilation and transformation of these races into a united Nation have been steadily progressing for centuries.

It is a country of mountains and valleys. Northern Burma is a land of steep, lofty mountains and narrow valleys, all covered by forests. The valleys of the Irrawady and the Sittang comprise level lands of rich alluvial soils which have extended to the extreme south along the coast of the tail of Burma.

The greater part of Burma being within the tropics, the climate is hot and damp. The hottest months are April and May when there is almost no rainfall. The monsoon breaks towards the latter part of May and continues almost daily until September. The delta and coastal areas are always humid. There are three seasons in Upper Burma, cold, hot and wet; but scarcely more than two in Lower Burma, wet and dry, both of them hot.

The situation of Burma is very important: (i) She is a vital link in the air route from India to Australia. (ii) She has a common land frontier with Thailand, French Indo-China and China. The *back doors* into China are Lashio, Taungyi and Maymyo; the Lashio route, commonly known as the *Burma Road*, is very important. (iii) She is also connected with the main sea-routes of the world.

Burma is an important source of many mineral products like petroleum, lead, zinc, tin, tungsten, nickel and cobalt. *She is sixth in the world in lead, second to China in tungsten, fifth among world producers of tin and an important producer of petroleum.* The country, however, has not so far developed important industries based on those minerals, except for the petroleum refining industry. Other minerals are exported in the raw or semi-finished state. The oil-fields of Burma are confined to the valley of Chindwin and the Lower Irrawady. The main oil-field lies at Yenangyaung, and there is a pipe-line running to Rangoon. The total annual production is more than 300 million gallons, or one-half per cent. of the world yield. Rich deposits of tin are found in Tenasserim. Bawdin contains one of the largest deposits of silver in the world. Coal is found in the Chindwin valley where

jade and amber mines are also worked. The Kalewa fields in the north-west Burma contain large deposits of fine quality coal, which, if properly developed, will make Burmese industry and transport free from foreign coal. The other minor minerals are rubies and wolfram, antimony, and salt. Exports of minerals are approximately equal to production.

The forests of Burma cover nearly 60 per cent. of the total area of the province. There are six types of forests in Burma *

- I. Tidal forest along the Arakan and Tenasserim coasts.
- II. Beach and dune forests above the high-tide limits of the Arakan and Tenasserim coast.
- III. Tropical evergreen forests, where rainfall is over 120 inches. Bamboo is the typical one.
- IV. Mixed deciduous forests where the rainfall is 40 to 120 inches. Teak and Padauk are the chief types in Upper Burma.
- V. Dry forests on the edge of the Dry Zone are a source of tanning material.
- VI. Sub-tropical and temperate forests are found on heights over 3000 feet with pines, oaks, fern and chestnuts.

Teak has always been the most valuable tree commercially, while *bamboo* is probably the most useful forest product from the point of view of the people. Teak is found on the Pegu Yomas and the eastern slopes of the Arakan Yomas and also on the Siamese border. The teak trees are dragged by trained elephants from the forest to a river to be floated down to the Delta ports. In recent years about 75 per cent. of the world's teak has come from Burma. Teak is unusually strong, durable and resisting to fungus. In 1939-40, Burma produced 400,000 tons of 50 cubic feet teak. Bamboo is put to several uses in Burma as household utensils, weapons, furniture, for making rafts and water conduits. The canes are becoming important for chair and basket industry.

Burma is essentially an agricultural land. Nearly 71 per cent. of the population are engaged in agriculture and forestry. Agriculture occupies about 20 million acres of land. Burma produces more than 5 million tons of rice annually. The Upper and Lower Irrawady valleys, the narrow coastal region on the west and Upper Tenasserim utilise more than 80 per cent. of their cultivated land

* *The Forests of Burma*, by E. F. Morehead (1944)

or wool producer. The wool of Northern India is white and of fair quality while in the Peninsular India, it is grey, short and coarse. The average annual production is little above 55 million lbs. "A good deal of the wool, which comes into the Indian market is dead wool, i.e., what has been removed from the carcasses of slaughtered sheep and not shorn."

PRODUCTION OF WOOL

Area	Production (million lbs.)
Jodhpur	8
Bikanir	5.7
Uttar Pradesh	5.2
Madras	4.5
East Punjab	4.3
Hyderabad	4.2
Jaipur	3.5

The wool production in India is largely consumed for village handicraft and manufacture of coarse blankets although a small portion is exported. The average annual export of raw wool is about 42 million lbs. A frequent complaint of the foreign consumers about Indian wool is the presence of excessive foreign matter such as sand, burrs etc. It is, therefore, desirable that wool should be properly washed and graded before export.

Goats may be considered as the poor man's cheap milk animal. Goat's milk is highly valued for human consumption, but the yield of milk from goats is very small. There are over 50 million goats in India. These animals are valued for their meat and milk and in places for their hair. Goats are very prolific and they are easily domesticated. Mules and horses are used in India mostly for drawing carts. There are 3 million such animals in India and these are found chiefly in the Punjab, U.P. and Bombay. Camels are mostly confined to the East Punjab and Western Rajputana. In these areas camels are largely used for ploughing and as draught animals.

Animal products in India are hides and skins, bone, wool, milk, butter and ghee. Hides and skins are used for making harnesses, bags, suitcases, trunks, machine belts, automobile tops and sets, cases for guns, shoes and gloves. The term hide denotes the skins of cattle, horses and camels while the term skin is

restricted to those of calves, sheep and goats. In India, the hides and skins are mostly collected from the slaughter-houses. West Bengal and Madras are the largest producers of cattle hides, Madras the largest producer of buffalo hides and sheepskins, and the Uttar Pradesh the largest producer of goatskins, followed by West Bengal and Bihar. The leather centres in India are Kanpur, Agra, Calcutta, Delhi and Madras.

INDIAN UNION'S ANNUAL PRODUCTION OF HIDES AND SKINS

Buffalo hides	.	52 lakh pieces
Cow hides	165	" "
Goatskins	. 297	" "
Sheepskins	. 118	" "

Indian hides and skins are purchased by the U.S.A., Germany, U.K., France, Belgium, Iraq, Iran and Burma. In 1948-49, the Republic of India exported 15,941 tons of raw hides and skins. In undivided India, the export figure was 30,000 tons. India's capacity to export hides has become limited because of partition.

The yield of milk per cattle is very erratic ranging between 5 to 17 lbs. per day. With a little attention, this can be raised to 15 lbs. per day for most of the milch cattle. "Compared with other countries India stands second in the volume of milk production, her output being exceeded only by the U.S.A. She produces over four times the output of Great Britain, over five times that of Denmark, over six times that of Australia and over seven times that of New Zealand."*

ESTIMATED TOTAL PRODUCTION OF MILK IN THE IMPORTANT PROVINCES

Madhya Pradesh	.	..	...	82·5
U. P.	...	...	..	1101·5
Bihar	...	...	...	559·18
Orissa	...	..	...	48·89
Assam	...	...	...	27·8
Bombay	...	...	...	182·66
Madras	...	...	...	465·19

* *Report on the Development of the Cattle and Dairy Industries of India* by N. Right.

miles above Mandalay. *Akyab*, on the western coast of Burma, is an important rice-exporting centre. Its great drawback is that it has no railway communication. It has a population of over 40,000. The principal imports are liquor, machinery, textiles and hardware. *Bassein*, on the south-west of the Irrawady Division, is situated at a distance of nearly 70 miles from the sea. It has direct railway communication with Rangoon. It is an important

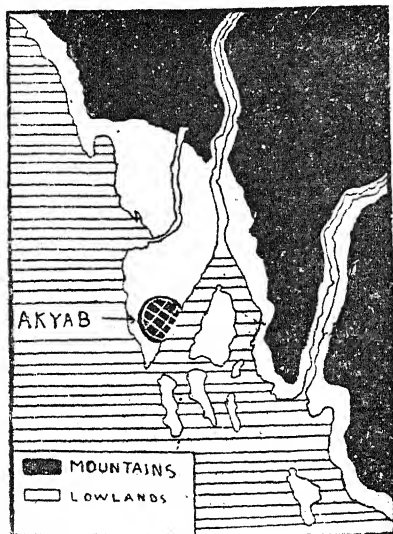


FIG. No. 100. Akyab and its hinterland. The port has no railway communication with hinterland.

rice shipping centre which is accessible to the sea by the main branch of the Bassein River. *Rangoon*, the chief port of Burma, is the capital of the country. It is situated on the Rangoon river and is about 25 miles from the sea. The principal imports are cotton manufactures, metals, provisions, silk, sugar, leather goods, machinery, paper, etc. The chief exports consist of rice, hides and skins, zinc, lead, timber, mineral oils, tobacco and rubber. It is connected by railways with the most important towns of the country. The value of

foreign trade in 1937-38 was worth Rs. 70 crores, of which imports accounted for Rs. 20 crores, *Moulmein*, on the Gulf of Martaban, is a large port. It is connected by railways with Rangoon. The opening of the railway line has increased its importance, and much of the former import traffic of Rangoon is to-day handled by Moulmein. The chief imports are steel, sugar, provisions and gunny bags; while the exports consist of timber, rubber, tin ore and tobacco. *Tavoy* is situated in the centre of the tail of Burma and is an important port. Wolfram and tin are the principal exports. *Mergui*, on the south-west coast of Tenasserim, is the centre of rubber and pearl-fishing industries.

The *per capita* production is hardly 8 ounces in India, being the lowest in the world.* India's problem of milk shortage can, however, be overcome by paying more attention to buffaloes. Cows cannot be as economically developed as buffaloes considering their return in milk. Buffalo stock in India can be improved by better feeding. The cattle of India require more fodder than they are getting now. This is a factor which makes it impossible for imported European breed of cattle to survive in this country. Besides, a number of useless cattle in India consume a large portion of India's already meagre available fodder.

The two important products of milk are butter and ghee. *The production of butter from milk has increased in recent years with the development of dairy farming.* The centres of this industry are Agra, Aligarh, Bombay and Calcutta. Practically the entire production is consumed in the country.

The dairy development activities in India are being pursued with vigour in a number of places. The state of Bombay has made remarkable progress in dairying. At Anand and Kaira district (266 miles north of Bombay) a large butter factory has been started with a capacity of 10,000 lbs. of butter a day. Its butter is sold throughout India. The Anand area also supplies 5,000 gallons of milk per day to Bombay city.† In Madras, a fairly modern milk pasteurising plant has been set up at Oatacomund. In U.P. there are dairies at Aligarh, Kanpur, Lucknow, Banaras and Allahabad.

Ghee has considerable demand in India and is "prepared by practically every household by heating butter over a slow fire until an oil is formed that rises to the surface while the refuse settles down as sediment." Ghee is used in the preparation of food and sweetmeats. Buffalo butter gives greater yield of ghee than that of cow. The ghee-producing areas are the U. P., Rajputana, Madhya Bharat and the East Punjab. The annual production of ghee in India is about 14 million maunds.

* The average consumption of milk per head per day ranges from 13 ounces in Assam to 16 ounces in East Punjab.

† The Bombay Government has acquired approximately 3,000 acres of land some 20 miles north of Bombay and is building there a model dairy colony which will accommodate approximately 15,000 milch cattle. The colony will also have a central dairy with a large pasteurising plant of a capacity of 4,000 gallons a day.

In spite of such remarkable progress, there are certain drawbacks in the industry. The present weakness of the Indian sugar industry lies in the high cost of production which is due to (a) seasonal character of the industry, (b) defective methods of extracting juice from the cane, (c) great waste in refining, (d) poor output, and (e) the impossibility in most cases of concentrating cultivation round the central factory. These defects may be removed. But the Government and the industrialists should pay attention to research and modernisation.

In Java the factories for turning the cane into sugar are near the plantations and the process of manufacturing sugar is so developed that there is no loss of sucrose. Attention is also paid in Java to the production of by-products like rum and methylated spirit. The sugar factories in India have no control over the sugar-cane cultivation which is in the hands of ryots. These ryots possess small holdings of land and are not in a position to arrange for harvesting when the cane has reached maturity and is in the optimum condition. Moreover, in India sugar-cane areas are generally found at a great distance from the factories: as a result, the factories have to depend for their supply of the raw material on remote areas and thus to pay high costs.

The most important by-products of sugar is molasses which can be used for the manufacture of power alcohol and methylated spirit. So far the sugar industry of India has not given much attention towards this direction. Then again, bagasse which is the crushed cane after the removal of juice is used at present as fuel. Bagasse can be utilized for making wrapping paper and straw boards.

The sugar market in India is extremely elastic. The present high price of sugar has kept the market confined mainly to the rich and the middle class people. A little reduction in the price will bring the produce within the financial capacity of the poor. The Indian Tariff Board has recommended as a means of lowering the cost of production of sugar and expanding the industry: (1) shifting of factories in the U.P. and Bihar to more suitable localities; (2) *allocation of sufficient funds to the Indian Sugarcane Committee for carrying out its five-year plan of research and development and* (3) *fixation of sugar prices at a fair and reasonable level.*

India. To begin with, stations will be located at Bombay, Cochin, Vizagapatam, Chandbali and Calcutta. Each station will have a cold storage plant with a capacity of 500 tons and refrigeratory motor vans for carrying fish to inland market by road.

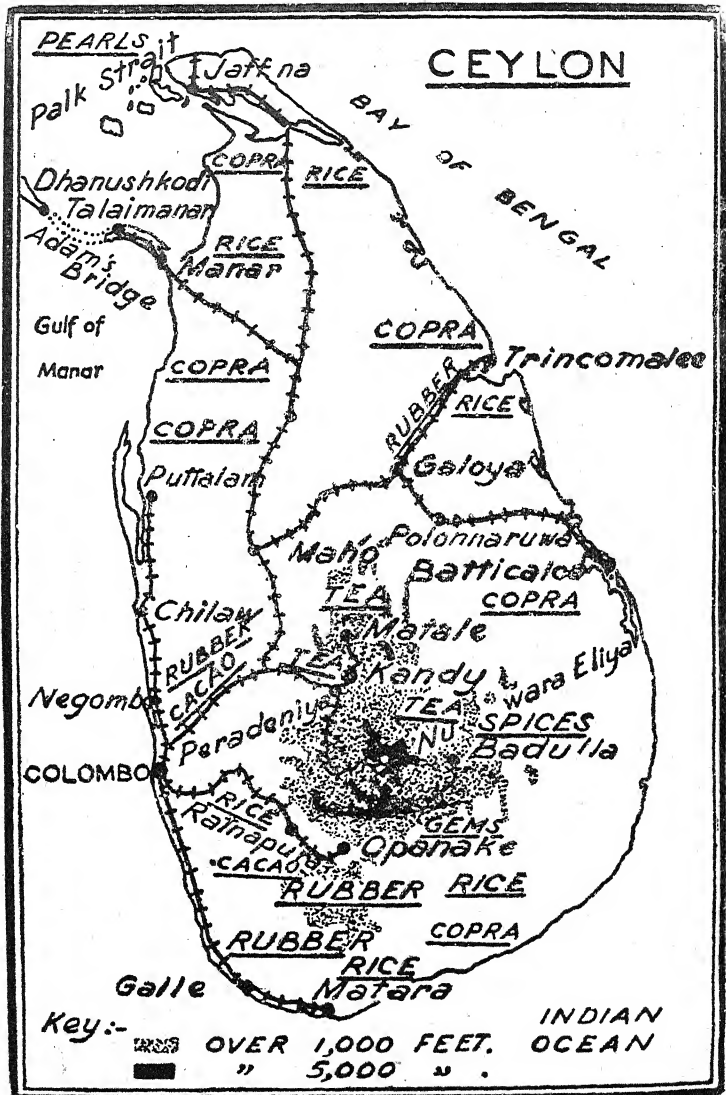
The Governments of the seaboard provinces have decided to encourage the formation of co-operative societies for the marketing and distribution of fish.

Certain industrial products are also obtained from fish in India. These are fish-oil, fish-meal, fish-manure, fish-maws and shark-fins.

Commercially, very valuable fishing consists of pearl fishing. There are two types of oysters which are sought after: the *window-pane* oyster whose shell is used for decorative purposes, and the true pearl oysters. Window-pane oysters are found in the open sea off the Coromondal coast, Madras coast and Cochin coast. The waters of the gulf dividing Indian Union from Ceylon and of the Arabian Sea near the edge of the Kathiawar peninsula, as well as in the Gulf of Cutch, are rich in oyster beds, yielding highly valuable pearls. Unlike the Japanese oysters which are found in shallow waters in sheltered bays, the Indian variety thrives in the deep sea and has so far failed to acclimatize itself to a shallow water existence.

Certain maritime provinces and States have built up an export trade in preserved fish to Ceylon, Burma and countries in the Far East. The export depends, to a certain extent, upon the nature of the fishing season along the south-west coast of India, a favourable season resulting in an increased exportable surplus.

Madras, Travancore and Cochin are the chief exporting areas. In 1952-53, the volume of fish exported from India was 500,000 cwt. valued at Rs. 378 lakhs. Ceylon is the principal buyer, the average of her share being 80 per cent.



INDEX

- Abstinence, 25
- Accumulation, *see* Investment
- Capital*, dates of publication, vii
 references, 116-20
- Cassel, 66
- Class conflict, 1, 4
- Commerce, 24 *n.*
- Communist Manifesto*, 38
- Competition, 2
 imperfect, 48, 90 *et seq.*
- Constant capital, 7; *see also*
 Organic composition
- Crisis, theories of, 4, 53 *et seq.*, 102-4
- Depreciation, 8, 15, 29
 and renewals, 53
- Discounting the future, 64, 66
- Disguised unemployment, 64 *n.*
- Disutility of labour, 2, 80
- Douglas, Major, 53
- Engels, vii, 18 *n.*, 29 *n.*, 42 *n.*, 92, 93
- Exploitation, orthodox sense, 25, 93 *n.*
- Exploitation, rate of, 8, 26, 40, 45, 97-8
 relative rates of, 18-19
- Export surplus, 56
- Factory Acts, 36
- Gesell, 51, 87
- Gold, 56, 73 *n.*, 79
- Gregory, 108
- Gullebaud, 65 *n.*
- Hegel, 15
- Hobson, 51
- House-building, 83, 109
- Imperialism, 3, 112*
- Inequality of income, and saving, 76; *see also* Underconsumption
- Interest, rate of, 66, 82-4, 114
- Inventions, 12, 37, 38, 41, 85
- Investment, 30, 52-6, 78-9
 inducement to, 34, 59, 73, 86, 114
- Kalecki, 47, 97 *n.*, 98 *n.*, 109 *n.*
- Keynes, 23 *n.*, 51, 73, 75 *n.*, 77 *et seq.*, 100, 107-8, 110, 115
- Lexis, 92-3
- Luxemburg, Rosa, 86
- Macmillan Report, 108
- Marshall, 25, 50, 64 *n.*, 75 *n.*, 76 *n.*, 89 *n.*, 95
- Marx Engels Correspondence*, 53 *n.*, 107 *n.*
- Moneybags, 21
- Monopoly, 4, 95
- Monopsony, 91, 108 *n.*
- * Natural resources, 15, 61

- (18) Vol. III, chap. 10 Compensation of the Average Rate of Profit by Competition.
- (19) *Ibid.*
- (20) *Ibid.*
- (21) Vol. III, chap. 38. Differential Rent.
- (22) Vol. III, chap. 39 The First Form of Differential Rent.
- (23) *Ibid.*
- (24) *Ibid.*
- (25) Vol. III, chap. 46. The Price of Land.
- (26) Vol. III, chap. 45 Absolute Ground-Rent.
- (27) Vol. I, chap. 1. Commodities. § 1. The Two Factors of a Commodity · Use-Value and Value.
- (28) Vol. I, chap. 7 The Labour Process and the Process of Producing Surplus-Value. § 2. The Production of Surplus-Value.
- (29) Vol. I, chap. 8. Constant Capital and Variable Capital.
- (30) *Ibid.*
- (31) *Ibid.*
- (32) *Ibid.*
- (33) Vol. I, chap. 3 Money, or the Circulation of Commodities § 1. The Measure of Values
- (34) Vol. I, chap. 5. Contradictions in the General Formula of Capital
- (35) Vol. I, chap. 1. Commodities. § 1. The Two Factors of a Commodity Use-Value and Value.
- (36) Vol. I, chap. 3. Money, or the Circulation of Commodities. § 2. The Medium of Circulation
- (37) Vol. III, Part VI. The Transformation of Surplus-Profit into Ground-Rent : chap. 37. Preliminaries.
- (38) Vol. I, chap. 1 Commodities. § 1. The Two Factors of a Commodity · Use-Value and Value.
- (39) Vol. I, chap. 11. Rate and Mass of Surplus-Value
- (40) Vol. III, chap. 9. Formation of a General Rate of Profit and Transformation into Prices of Production.
- (41) Vol. III, chap. 45. Absolute Ground-Rent.
- (42) Vol. I, chap. 7. The Labour Process and the Process of Producing Surplus-Value. § 2. The Production of Surplus-Value.
- (43) Vol. III, chap. 47. Genesis of Capitalist Ground-Rent. § 1. Introductory Remarks.
- (44) Vol. I, chap. 8. Constant Capital and Variable Capital.
- (45) Vol. III, chap. 48. The Trinitarian Formula, § 3.
- (46) Vol. I, chap. 12. The Concept of Relative Surplus-Value.
- (47) Vol. I, chap. 25. The General Laws of Capitalist Accumu-

- lation § 2. Relative Diminution of the Variable Part of Capital.
- (48) Vol. I, chap. 15. Machinery and Modern Industry § 6 The Theory of Compensation as regards the Work-people displaced by Machinery
 - (49) Vol. III, chap. 32 Money-Capital and Actual Capital (*concluded*).
 - (50) Vol. I, chap 32 Historical Tendency of Capitalist Accumulation
 - (51) Vol. III, chap 17. Commercial Profit
 - (52) Vol. I, chap 18 Various Formulæ for the Rate of Surplus-Value.
 - (53) Vol. III, chap 10. Compensation of the Average Rate of Profit by Competition.
 - (54) Vol. III, chap 39 The First Form of Differential Rent.
 - (55) Vol II, Part III. The Reproduction and Circulation of the Aggregate Social Capital chap 18 Introduction. § 2 The Role of Money Capital
 - (56) Vol. III, chap 49 A Contribution to the Analysis of the Process of Production.
 - (57) Vol. I, chap 1. Commodities § 4. The Fetishism of Commodities and the Secret thereof
 - (58) Vol III, chap 15 Unravelling the Internal Contradictions of the Law § 4. Supplementary Remarks
 - (59) Vol. II, chap. 16. The Turn-over of the Variable Capital. § 3 The Turn-over of the Variable Capital, considered from the Point of View of Society.
 - (60) Vol. I, chap. 24. The Conversion of Surplus-Value into Capital. § 3 Separation of Surplus-Value into Capital and Revenue.
 - (61) Vol. III, chap. 15. Unravelling the Internal Contradictions of the Law § 1 General Remarks.
 - (62) Vol. I, chap. 25. The General Law of Capitalist Accumulation. § 1 The Increased Demand for Labour-Power that Accompanies Accumulation, the Composition of Capital Remaining the Same
 - (63) Vol I, chap 25. The General Law of Capitalist Accumulation § 3. Progressive Production of a Relative Surplus-Population.
 - (64) *Ibid.*
 - (65) Vol. I, chap. 6. Buying and Selling of Labour-Power
 - (66) Vol. I, chap. 10. The Working Day. § 1. The Limits of the Working Day.
 - (67) Vol. I, chap. 15. Machinery and Modern Industry.

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- (68) *Ibid.* (a) Appropriation of Supplementary Labour-Power by Capital.
- (69) Vol. I, chap. 10. The Working Day. § 5 The Struggle for a Normal Working Day.
- (70) Vol. I, chap. 25. The General Law of Capitalist Accumulation. § 1. The Increased Demand for Labour that Accompanies Accumulation, the Composition of Capital Remaining the Same.
- (71) *Ibid.* • § 3. Progressive Production of a Relative Surplus-Population.
- (72) *Ibid.*
- (73) *Ibid.*
- (74) *Ibid.* § 1 The Increased Demand for Labour-Power that Accompanies Accumulation, the Composition of Capital Remaining the Same
- (75) *Ibid.* § 3. The Progressive Production of a Relative Surplus-Population
- (76) Vol. I, chap 15 Machinery and Modern Industry. § 9. The Factory Acts.
- (77) Vol. I, chap. 14. Division of Labour and Manufacture. § 5. The Capitalist Character of Manufacture.
- (78) Vol. I, chap. 17 Changes of Magnitude in the Price of Labour-Power and in Surplus-Value. § 1. Length of the Working Day and Intensity of Labour Constant. Productiveness of Labour Variable.
- (79) Vol. III, chap 14 Counteracting Causes § 3 Cheapening of the Elements of Constant Capital.
- (80) Vol. III, chap. 13. The Theory of the Law.
- (81) Vol. III, chap. 14. Counteracting Causes.
- (82) *Ibid.* § 1. Raising the Intensity of Exploitation.
- (83) *Ibid.* § 2 Depression of Wages below their Value.
- (84) *Ibid.* § 4 Relative Overpopulation
- (85) Vol III, chap. 15. Unravelling the Internal Contradictions of the Law. § 2 Conflict between the Expansion of Production and the Creation of Values.
- (86) *Ibid.* § 3. Surplus of Capital and Surplus of Population.
- (87) Vol. I, chap. 3. Money, or the Circulation of Commodities. § 2. The Medium of Circulation.
- (88) Vol. II, chap. 20. Simple Reproduction. § 2. The Two Departments of Social Production.
- (89) *Ibid.* § 1. The Formulation of the Question.
- (90) *Ibid.* § 3. The Transactions between the Two Departments.

AN ESSAY ON MARXIAN ECONOMICS

- (91) Vol. II, chap 20. § 4 Transactions within Department II.
- (92) *Ibid* § 11 Reproduction of the Fixed Capital.
- (93) *Ibid*.
- (94) Vol II, chap. 9 The Total Turn-over of Advanced Capital. § 4.
- (95) Vol. II, chap. 16. The Turn-over of the Variable Capital. § 3. The Turn-over of the Variable Capital, considered from the Point of View of Society
- (96) *Ibid*.
- (97) *Ibid*.
- (98) Vol. II, chap 20. § 11. Reproduction of the Fixed Capital
- (99) *Ibid*. § 12. The Reproduction of the Money Supply.
- (100) Vol II, chap. 21 Accumulation and Reproduction on an Enlarged Scale § 1. Accumulation in Department I
- (101) Vol II, chap 20 Simple Reproduction § 4 Transactions within Department II.
- (102) Vol II, chap 16 The Turn-over of the Variable Capital. § 3 The Turn-over of the Variable Capital, considered from the Point of View of Society.
- (103) Vol III, chap. 15. Unravelling the Internal Contradictions of the Law § 1 General Remarks
- (104) Vol. III, chap 30. Money-Capital and Actual Capital
- (105) Vol. I, chap. 3. Money, or the Circulation of Commodities. § 2. The Medium of Circulation, (b) The Currency of Money.
- (106) *Ibid*. § 3. Money, (b) Means of Payment
- (107) Vol. III, chap. 22 Rate of Interest.
- (108) Vol III, chap 15. Unravelling the Internal Contradictions of the Law. § 2. Conflict between the Expansion of Production and the Creation of Values.
- (109) Vol. II, chap 17. The Circulation of Surplus-Value § 1. Simple Reproduction.
- (110) Vol. I, chap. 25. The General Law of Capitalist Accumulation. § 3 Progressive Production of a Relative Surplus-Population.
- (111) Vol. II, chap. 17. The Circulation of Surplus-Value § 1. Simple Reproduction.
- (112) *Ibid*.
- (113) *Ibid*.
- (114) Vol. III, chap. 15. Unravelling the Internal Contradiction of the Law. § 2. Conflict between the Expansion of Production and the Creation of Values.

- Organic composition of capital, 8, 17, 41
- Pigou, 25, 70 *n.*, 83 *n.*, 99 *n.*, 100 *n.*
- Productivity of capital, 21, 22
of labour, 20, 23, 38, 46
marginal, 31, 43, 62
- Profit margin, 88, 90, 96, 111
rate of, 7, 40, 42, 48-9, 73
relative rates of, 12, 17, 69
- Pursuit curve, 73
- Quantity theory of money, 81
- Rent, 12, 28, 61
absolute, 25 *n.*
- Rentiers*, 22, 82, 109
- Research, 111-12
- Reserve army, 35 *et seq.*, 59, 85, 102
- Risk-bearing, 66, 71
- Robertson, 54 *n.*
- Robinson Crusoe, 28 *n.*
- Robinson, Joan, 46 *n.*, 76 *n.*, 82 *n.*, 108 *n.*
- Rothbarth, vii
- Saving, 76 ; *see also* Investment
- Say's Law, 50, 60, 102, 104, 106
- Smith, Adam, 91
- Socially necessary labour, 7, 16
- Static equilibrium, 62, 70, 73
- Subsistence level, *see* Wages
- Substitution, 10, 63
- Supply price of capital, 13, 68, 71, 113
- Surplus, 7 ; *see also* Profit
- Technical progress, *see* Inventions
- Turnover, period of, 8, 42
- Under-consumption, 57, 85, 86
- Unpaid labour, 8, 26
- Use-value, 13
- Utilisation of capital, 9, 48, 49, 89
- Value, 7, 15, 23
and price, 16-18, 29-32
of labour-power, 14 *n.*, 35 *n.*, 47
- Value, Price and Profit*, 106 *n.*
- Variable capital, 7 ; *see also* Organic composition
- Voltaire, 27
- Wages, and prices, 100-102, 106-7
of skill, 14, 23
real, 11, 35, 39, 43, 108
see also Exploitation
- Waiting, 25, 64
- Wicksell, 67, 68
- Wolf, 18 *n.*
- Working day, length of, 36, 45, 46

